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

2013 PUBLIC COMMENT AGENDA FOR THE PROPOSED CHANGES TO THE 2012 EDITIONS OF THE

INTERNATIONAL CODES ADMINISTRATIVE PROVISIONS

INTERNATIONAL ENERGY CONSERVATION CODE®

-Commercial

-Residential

INTERNATIONAL EXISTING BUILDING CODE®

INTERNATIONAL FIRE CODE®

ICC PERFORMANCE CODE®

INTERNATIONAL RESIDENTIAL CODE®

-Building

-Mechanical

-Plumbing

-Energy

INTERNATIONAL PROPERTY MAINTENANCE CODE®

INTERNATIONAL SWIMMING POOL AND SPA CODE®

INTERNATIONAL WILDLAND-URBAN INTERFACE CODE®

October 2nd – 10th, 2013

ATLANTIC CITY CONVENTION CENTER

ATLANTIC CITY, NEW JERSEY

First Printing

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TABLE OF CONTENTS

PAGE

INTRODUCTION

This publication contains the Public Comment Agenda for consideration at the Public Comment Hearings of the International Code Council on October 2 – 10, 2013 at the Atlantic City Convention Center in Atlantic City, NJ (see page 1). See page xxix for hearing schedule.

This publication contains information necessary for consideration of public comments on the proposed code changes which have been considered in the ICC Committee Action Hearings held on April 21st – April 30th at the Sheraton Dallas Hotel in Dallas, TX. More specifically, this agenda addresses hearings on public comments on proposed code changes to the *International Existing Building Code, International Energy Conservation Code, International Fire Code, International Property Maintenance Code, International Residential Code, International Swimming Pool and Spa Code, International Wildland-Urban Interface Code, I-Code Administrative Provisions, ICC Performance Code,* and portions of *International Building Code, International Mechanical Code, International Plumbing Code* and *International Private Sewage Disposal Code,* considered by the respective Code Committee at the Committee Action Hearings.

ICC GOVERNMENTAL MEMBER REPRESENTATIVES

Council Policy #28, Code Development (page xiii) requires that applications for Governmental Membership must have been received by April 1st of this year in order for the representatives of the Governmental member to be eligible to vote at this Public Comment Hearing. Further, *CP#28* requires that ICC Governmental Member Representatives reflect the eligible voters **30 days prior** to the start of the Public Comment Hearings. This includes new, as well as changes, to voting status. Section 7.4 of *CP#28 (page xxiv) reads as follows:*

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

As such, new and updated eligible voter status must be received by ICC's Member Services Department by August 30, 2013. This must be done via the Electronic Voter Designation System (see p. v). Access the Electronic Voter Designation System directly by logging on to www.iccsafe.org/EVDS and using the email address and password connected to your Primary Representative account. The online form can also be accessed by logging onto "My ICC" and selecting "Designate Voters" or through the Electronic Voter Designation link in the left hand menu on the ICC home page at www.iccsafe.org. These records will be used to verify eligible voter status for the Public Comment Hearing. Voting members are strongly encouraged to review their membership record for accuracy well in advance of the Public Comment Hearing so that any necessary changes are made prior to the August 30th deadline. Representatives of any governmental member that has made application for membership after April 1 will not be able to vote.

ICC Policy on Financial Assistance for Governmental Member Voting Representatives

ICC Council Policy #CP-36 defines the circumstances under which it is permissible for Governmental Member Voting Representatives to accept funds to enable a Governmental Member Voting Representative to attend ICC code hearings. The policy seeks to prohibit, or appropriately regulate financial assistance which is designed to increase Participation by a Particular interest group or by those supporting a Particular position on a proposed code change.

Prior to receiving a voting device, each Governmental Member Voting Representative will have to sign a written certification that he/she has complied with ICC policy regarding the receipt of financial assistance in connection with attendance at the hearing. All Governmental Member Voting Representatives will be expected to be familiar with and understand such policy, and to have inquired of ICC well in advance of the hearing regarding any questions or uncertainty about the application of such policy. A Governmental Member Voting Representative who does not sign the compliance certification, or who is determined to ii have accepted financial assistance from a prohibited source, *will NOT be permitted to vote at the hearing.* Improper acceptance of financial assistance, or misrepresentation by a Governmental Member Voting Representative about compliance with CP-36, which are discovered after a code hearing, may result in sanctions regarding voting at future hearings by the Governmental Member Voting Representative or by other Governmental Member Voting Representatives from the same governmental member. CP-36 provides, in pertinent Part:

2.0. Contributions. To allow industry and the public to contribute to the goals of the ICC in transparent and accountable processes, organizations and individuals are permitted to contribute financial assistance to Governmental Members to further ICC Code Development Activities provided that:

2.1 Contributions of financial assistance to Governmental Member Voting Representatives for the purposes of enabling participation in ICC Code Development Activities are prohibited except for reimbursements by the ICC or its subsidiaries, a regional, state, or local chapter of the ICC, or the local, state or federal unit of government such Governmental Member Voting Representative is representing. For the purposes of this policy financial assistance includes the payment of expenses on behalf of the Governmental Member or Governmental Member Voting Representative. Governmental Member Voting Representatives may self-fund for purposes of participating in ICC Activities.

2.2 A Governmental Member accepting contributions of financial assistance from industry or other economic interests shall do so by action of its elected governing body or chief administrative authority. A Governmental Member Voting Representative may not directly accept financial assistance from industry or other economic interests.

2.3 Any contributions to a Governmental Member of the ICC shall comply with applicable law, including but not limited to a Governmental Member's ethics, conflict of interest or other similar rules and regulations.

For further information about CP-36, please visit:
http://www.iccsafe.org/MEMBERSHIP/Pages/2010FinancialAssistance.aspx
To view ICC Policy CP-36 please go to the following link:
http://www.iccsafe.org/AboutICC/Documents/CP36-09.pdf

ADVANCE REGISTRATION

The Public Comment Hearings are only one component of the 2013 Annual Conference and Public Comment Hearings. The information required for the Education Program is listed on page vii. **All attendees to the Public Comment Hearings are required to register. Registration (see page vii) for the Public Comment Hearings is FREE, and is necessary to verify voting status (see above). You are encouraged to register prior to the Public Comment Hearings.**

NOTICE: If you or your companion require special accommodations to participate fully, please advise ICC of your needs.

AGENDA FORMAT

This Public Comment Hearing Agenda includes the Consent Agenda and the Individual Consideration Agenda for the code provisions that comprise the 2013 Code Development Cycle. This will complete the Public Comment Hearings for the 2013 Code Development Cycle.

The Consent Agenda is comprised of proposed changes to the *International Existing Building Code, International Energy Conservation Code, International Fire Code, International Property Maintenance Code, International Residential Code, International Swimming Pool and Spa Code, International Wildland-Urban Interface Code, I-Code Administrative Provisions, ICC Performance Code,* and portions of *International Building Code, International Mechanical Code, International Plumbing Code* and *International Private Sewage Disposal Code* which did not receive a successful assembly action or public comment, and therefore are not listed on the Individual Consideration Agenda.

The Individual Consideration Agenda is comprised of proposed changes to the codes which received a successful assembly action or received a public comment in response to the Code Committee's action at the Committee Action Hearings.

Items on the Individual Consideration Agenda are published with information as originally published for the Committee Action Hearing as well as the published hearing results. Following the hearing results is the reason that the item is on the Individual Consideration Agenda followed by the public comments which were received.

Public testimony will follow the procedures given in *CP#28-05 Code Development* as published on page xiii. Refer to the tentative hearing order on page xxxi.

MODIFICATIONS & PUBLIC COMMENTS

In addition to modifications made by a committee at the Code Development hearings, *CP#28 Code Development* allows modifications to be made by the assembly at the Committee Action Hearings. In addition modifications can be proposed in form of a Public Comment following the Committee Action Hearings. The Public Comment deadline was July 15, 2013 and all Public Comments received have been incorporated into this document. <u>Further modifications are not permitted beyond those published in this agenda.</u>

Proposed changes on the Individual Consideration Agenda at the Public Comment Hearings may have up to five possible motions - Approval as Submitted, Approval as Modified by the Code Committee, Approval as Modified by a successful Assembly Action, Approval as Modified by a Public Comment, or Disapproval. A Final Action Discussion Guide will be posted and copies available at the hearing which includes a list of allowable motions.

CONSENT AGENDA

The Public Comment Consent Agenda consists of proposals which have neither an assembly action nor public comments. The Public Comment Consent Agenda for each code or segment of code changes will be placed before the assembly with a single motion for final action in accordance with the results of the Committee Action Hearing at the beginning of the respective portion of the hearings. For codes which have no code change proposals on the Individual Consideration Agenda, a motion for the final action in accordance with the results of the Committee Action Hearing will be placed before the assembly at the beginning of the hearings.

INDIVIDUAL CONSIDERATION AGENDA

The Public Comment Hearing Individual Consideration Agenda is comprised of proposals which have an assembly action or public comment. Some code change proposals have multiple Parts (i.e. CE84-13, Parts I and II). Where a public comment was submitted to more than one Part of these multiple Part code change proposal, each Part of the code change is heard with the code in which the proposal was originally published, but each Part is published separately (CE84-13, Part I and CE84-13, Part II) and considered separately. All proposed changes on the Individual Consideration Agenda shall be placed before the assembly for individual consideration of each item. The hearing order is found on page xxix and the agenda starts on page 1.

ICC PUBLIC COMMENT HEARING PROCESS

The hearing process will follow CP #28. The process is summarized as follows (CP #28 sections noted):

1. At the start of each portion of the hearings (i.e. Administrative Provisions, Swimming Pool and Spa, Property Maintenance, etc.):
   - Requests to withdraw code changes
   - Requests to withdraw public comments
   - Requests to revise the hearing order
   - Consent Agenda voted (Section 7.3.4)

2. The first code change on the hearing order brought to the floor with a standing motion to sustain the committee action.

3. If the Committee Action is not Disapproval, a motion to approve a modification by a public comment may be presented (Section 7.3.8.3).

4. Public testimony on either the Committee Action (if Disapproval) or the public comment (Section 5.5.1)

5. ICC Governmental Member Representatives and Honorary Members ("eligible voters') in attendance vote on the motion under consideration. (Section 7.5 for voting majorities)

6. Depending on the motion and action determined by the vote, subsequent allowable motions in accordance with Sections 7.3.8.3 can be considered or voting on the main motion in accordance with 7.3.8.4 is taken. (A Final Action Discussion Guide will be posted and copies available at the hearing which includes a listing of allowable motions.)

7. The final action on the code change determined by a vote of the eligible voters is announced. In accordance with Section 7.3.6, reconsideration is not permitted.

8. Repeat 2 – 7 for subsequent code changes

FINAL ACTION ON CODE CHANGE PROPOSALS WITH CHANGE OF SCOPE PROPOSED

Code change proposals ADM3 and EB3, considered by the Administrative Code Change Committee and the Existing Building Committee, respectively, address the scope and application of the *International Existing Building Code.* As reported at the Committee Action Hearing, the action taken by the respective code development committees on these proposals coupled with the final action taken at the 2013 Public Comment Hearings will be limited to an advisory recommendation to the ICC Board of Directors who will determine the final disposition on these proposed changes in accordance with Section 1.3 of CP 28, which stipulates that the Board determines the scope of the I-Codes.

ICC WEBSITE - WWW.ICCSAFE.ORG

While great care has been exercised in the publication of this document, there may be errata posted for the Public Comment Agenda. Errata, if any, identified prior to the Public Comment Hearings will be posted on the ICC website at www.iccsafe.org. Users are encouraged to periodically review the ICC Website for updates to the 2013 Public Comment Hearing Agenda.

ELECTRONIC VOTING

Electronic voting by the ICC Governmental Member Representative in attendance at the Public Comment Hearings, will continue to be used. Eligible voters will be issued a handheld device to be used to cast their vote. Please see "ICC Policy on Financial Assistance for Governmental Member Voting Representatives" on page ii.

VIEW THE PUBLIC COMMENT HEARINGS ON YOUR PC

The Public Comment Hearings are scheduled to be "webcast". Streaming video broadcast over the Internet will provide a gateway for all International Code Council members, the construction industry and other interested parties anywhere in the world to view and listen to the hearings. Logging on to the Internet broadcast will be as simple as going to the International Code Council web site, www.iccsafe.org, and clicking on a link. [Actual site to be determined - be sure to check the ICC web site for further details].

The hearings can be seen free by anyone with Internet access. Minimum specifications for viewing the hearings are an Internet connection, sound card and Microsoft Windows Media Player. DSL, ISDN, Cable Modems or other leased-line connections are recommended for the best viewing experience. A dial-up modem connection will work, but with reduced video performance.

cdpACCESS Update

As reported in the 2013 Group B Code Change Agenda and Report of Committee Action, the project team is busy working on the development and testing of the cdpACCESS system. As of this Public Comment Agenda posting, the code change development and submittal features as well as the collaboration features will have been presented in a webinar on August 28th. This webinar will be recorded so if you missed it, you'll be able to access it on our website. Future webinars and video sessions are planned as well. Notifications will be posted on the cdpACCESS website (see below) as well as by email via the ICC eNews and Codes & Standards News.

Coming up in Atlantic City, the following is planned:

Tuesday, October 1st

There will be a training session offered which is entitled "The Future of Code Development and Delivery: cdpACCESS". The session will be a hands-on session that details what the new process will be, including:

- How to perform a secure log-on into the system
- How to access the database of I-Codes which will be used to develop your code change
- How to develop a code change online
- How to submit your code change online
- How to collaborate online
- A demo of the online voting process
- A demo of the new electronic voting devices that will be used at the Public Comment Hearings when cdpACCESS goes live in 2014.

Information on registration for the training session is found on page vii.

During the 2013 Public Comment Hearings

Periodically during the hearings, during the consideration of actual code changes, the moderator will explain how the cdpACCESS online voting will occur following the Public Comment Hearings. For those code changes identified during the hearing, follow-up testing of the online voting on these code changes will be performed. This is only a test and the results are not binding.

The 2014 cycle for the development of the 2015 *International Green Construction Code* (IgCC) will use the new cdpACCESS system. We anticipate that the system will go live on November 15, 2013 to support the 2014 cycle. cdpACCESS will be online in 2015 for the development of all the 2018 I-Codes.

It must be emphasized how important it will be for code development participants to access the system when it goes live on November 15th. For those who will be submitting a code change to the IgCC, the online submittal deadline is January 6, 2014 – don't wait until the last minute to log on to the system and learn the process. For those of you who will not be submitting code changes to the IgCC, but will be submitting code changes to 2015 Group A codes, you too should log on and become familiar with the system.

A PowerPoint entitled "Key Features" is posted on the cdpACCESS website. The direct link is:
http://www.iccsafe.org/cs/cdpACCESS/Documents/cdpACCESS_KeyFeatures.pdf

For additional information on cdpACCESS, be sure to visit the website at:
http://www.iccsafe.org/cs/cdpACCESS/Pages/default.aspx

Registration
Delegate

INTERNATIONAL CODE COUNCIL

2013 Annual Conference and Public Comment Hearing
September 29 – October 10
Atlantic City Convention Center, Atlantic City

FIRST NAME AND M.I. Please select the job title that best fits your current position.	LAST NAME/SURNAME
JOB TITLE	OTHER
JURISDICTION/ORGANIZATION	
MAILING ADDRESS	
CITY	STATE/PROVINCE ZIP/POSTAL CODE
COUNTRY	E-MAIL (MUST PROVIDE TO RECEIVE CONFIRMATION)
PHONE (SPECIFY COUNTRY AND CITY CODE IF OUTSIDE THE U.S.)	FAX (SPECIFY COUNTRY AND CITY CODE IF OUTSIDE THE U.S.)

Are you an ICC Member? ☐ NO ☐ YES, my ICC Membership Number is: ______________ ☐ Check here if this is your first ICC Conference.

Type of Registration	ICC Member (BEFORE AUGUST 16)	Nonmember (BEFORE AUGUST 16)	ICC Member (AFTER AUGUST 16)	Nonmember (AFTER AUGUST 16)
☐ Full Conference Registration (includes all business, education and social functions)	$600*	$725*	$660*	$785*
☐ Public Comment Hearing only (Registration is required to verify voting status)	FREE Registration		FREE Registration	
☐ One-Day Education ☐ Monday, September 30 ☐ Tuesday, October 1 ☐ Wednesday, October 2	$99	$125	$125	$150

REGISTER BY AUGUST 16 AND SAVE!

All fees are in U.S. dollars.

TOTAL $ ______________

Payment Options: ☐ BILL ME (ICC MEMBERS ONLY) ☐ CHECK (PAYABLE TO ICC)
☐ VISA ☐ MASTERCARD ☐ AMERICAN EXPRESS

SIGNATURE

CREDIT CARD NUMBER EXP. DATE SECURITY CODE†

CARD HOLDERS NAME

The Code Council reserves the right to photograph or videotape events for promotional purposes. Your registration serves as permission for ICC to copyright, publish and use your likeness in print, online or in other media. If you do not wish to be photographed or videotaped, please tell the camera operator.

Cancellation Policy: *All cancellation requests must be received in writing. Cancellations received prior to September 1 will receive a full refund. Requests received between September 2–15 will be refunded, less a $50 administrative charge. Cancellations received after September 15 will not be eligible for a refund.*

**Take $10 off when you register online.*

***Payment is required with registration.*

†A three-digit or four-digit number printed on the front or back of the credit card for security purposes.

TO ATTEND EDUCATION SESSIONS, PLEASE COMPLETE THE EDUCATION PROGRAM FORM ON REVERSE.

Save $10 When You Register Online

Register online: www.iccsafe.org/conference

Fax to: (708) 799-2307

Mail to: 2013 ICC Annual Conference
International Code Council
4051 W. Flossmoor Road
Country Club Hills, IL 60478

Phone registrations are not accepted.
Please do not fax AND mail your registration.

Lodging information available online.

If you have any questions, please call 1-888-ICC-SAFE, x4328 or x4226.

›››**NOTICE:** ICC requires that facilities are in compliance with the Americans with Disabilities Act regulations. ICC will provide auxiliary aids and special services upon request. Please contact Jackie Claus at jclaus@iccsafe.org of your needs.

REQUIRED INFORMATION FOR EDUCATION PROGRAM

Last Name ______________________ First Name ______________________

SESSION SELECTION

If you are registering for the full conference, please enter a session name for each time slot. For a list of Education Sessions, please refer to website.
If you are registering for one day of education only, please check the day you will be attending and enter your session name.

☐ Monday, September 30
1 – 4:15 pm
Session name: ______________________

☐ Tuesday, October 1
1 – 4:15 pm
Session name: ______________________

☐ Wednesday, October 2
8 – 11:15 am
Session name: ______________________

EARN CEUs

Earn continuing education recognition for attending sessions at the Conference. Indicate your choice(s) and provide your license or credential number (ID number) for each:

ALABAMA
☐ Board of Heating & Air Conditioning Contractors
ID Number ______________________

CALIFORNIA
☐ Council for Interior Design Certification/CCIDC
ID Number ______________________

CONNECTICUT
☐ Department of Public Safety, Office of Education & Data Management
ID Number ______________________

FLORIDA
☐ Building Code Administrators & Inspectors Board
ID Number ______________________

☐ Florida Professional Engineers Board
ID Number ______________________

GEORGIA
☐ Fire Fighter Standards and Training Council
ID Number ______________________

KANSAS
☐ Johnson County Contractor Licensing
ID Number ______________________

KENTUCKY
☐ Division of Building Code Enforcement, Department of Housing, Buildings, & Construction
ID Number ______________________

MAINE
☐ State Planning Office
ID Number ______________________

MASSACHUSETTS
☐ Board of Building Regulations and Standards
ID Number ______________________

MARYLAND
☐ Hartford County Department of Inspections, License & Permits, Building Services
ID Number ______________________

MICHIGAN
☐ Office of Fire Safety
ID Number ______________________

☐ Bureau of Construction Codes
ID Number ______________________

MISSOURI
☐ Board of Professional Registration – APELSLA
ID Number ______________________

NEW JERSEY
☐ Department of Community Affairs, Division of Codes and Standards
ID Number ______________________

☐ Department of Community Affairs, Division of Fire Safety
ID Number ______________________

NEW YORK
☐ Department of State, Codes Division
Requires Social Security # ______________________
ID Number ______________________

☐ Department of State, Office of Fire Prevention
Requires Social Security # ______________________
FDID #/City Code ______________________
County Code ______________________
ID Number ______________________

NORTH CAROLINA
☐ Code Officials Qualification Board
Requires Driver's License # ______________________
ID Number ______________________

OHIO
☐ Ohio Department of Commerce, Board of Building Standards
ID Number ______________________

☐ Ohio Department of Commerce, Division of Industrial Compliance, Plumbing Section
ID Number ______________________

OKLAHOMA
☐ Construction Industries Board, Inspector Examining Committee
ID Number ______________________

PENNSYLVANIA
☐ Department of Labor and Industry
ID Number ______________________

RHODE ISLAND
☐ State Building Code Commission
ID Number ______________________

SOUTH CAROLINA
☐ Department of Labor, Licensing and Regulation Board of Building Codes Council
ID Number ______________________

TENNESSEE
☐ Commerce and Insurance, Fire Prevention Division (aka State Fire Marshal's Office)
ID Number ______________________

TEXAS
☐ Department of Licensing and Regulation, Electrical Safety and Licensing Advisory Board
ID Number ______________________

UTAH
☐ Division of Occupational and Professional Licensing, Contractor Licensing
ID Number ______________________

WISCONSIN
☐ Safety and Buildings Division
ID Number ______________________

☐ **AMERICAN INSTITUTE OF ARCHITECTS**
ID Number ______________________

☐ **AMERICAN SOCIETY OF HOME INSPECTORS**
ID Number ______________________

☐ **INTERNATIONAL CODE COUNCIL**
ID Number ______________________

☐ **OTHER**
ID Number ______________________

Many professional organizations, boards, and state agencies recognize ICC educational offerings. If you do not find your professional organization or agency listed above, you may still be able to earn continuing education credit by attending these educational sessions. To find out if a specific ICC offering has been recognized by a specific board/agency for continuing education credit, contact the applicable agency/board. ICC cannot guarantee that a specific professional board, organization, or agency will recognize an ICC educational offering.

2012 - 2014 ICC CODE DEVELOPMENT SCHEDULE

(Updated December 12, 2012)

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

Notes:

- Be sure to review the document entitled “Group A, Group B and Group C Code Development Committee Responsibilities” posted at www.iccsafe.org/responsibilities which identifies committee responsibilities which are different than Group A, B and C codes which may impact the applicable code change cycle and resulting code change deadline. This document is also linked from the Public Code Change Proposal Form. As an example, throughout Chapter 9 of the IBC (a Group A code), there are numerous sections which include an “[F]” which indicates that the provisions of the section are maintained by the Fire Code Development Committee (a Group B code).
- The International Green Construction Code (IgCC) and International Swimming Pool and Spa Code (ISPSC) were subjected to a full cycle of code development in 2011 resulting in 2012 editions published in March/2012.
- Group B “Admin” includes code change proposals submitted to Chapter 1 of all the I-Codes except the IECC, IgCC, IRC, ISPSC, and the ICCPC and the administrative update of referenced standards in all the 2012 I-Codes. Proposed changes to Chapter 1 of the IECC, IgCC, IRC, ISPSC and ICCPC will be considered by the applicable Code Development Committee.
- Final Action Hearing note: The dates indicated for the Final Action Hearings are based on an assumed start of the hearings on the Wednesday of the respective Annual Conference. Public comment volume may dictate that the Final Action Hearing on one or more of the codes be held on Monday afternoon (with the code completed in the Monday session) in order for the Final Action Agenda for all the codes to be completed in the time allotted. Be sure to consult the posted Final Action Hearing Schedule.
- A comprehensive review of the 2012 – 2014 code groupings will be performed no later than upon receipt of IgCC code change proposals in January/2014 with the potential for 2015 – 2017 code groupings to change. Any changes will be posted at that time. The 2015 – 2017 Cycle will begin with Group A code change proposals due January 5, 2015.
- This updated schedule utilizes the revised hearing terms noted in the cdp ACCESS report, as follows:

Old term	Revised term
Code Development Hearing	Committee Action Hearing
Report of the Public Hearing	Report of the Committee Action Hearing
Final Action Agenda	Public Comment Agenda
Final Action Hearing	Public Comment Hearing

2012 - 2014 STAFF SECRETARIES

GROUP A (2012)

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

GROUP B (2013)

ADMINISTRATIVE Chapter 1 All Codes Except IRC	IEBC	IECC-Commercial	IECC-Residential	IFC
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ICC PC	**IPMC**	**IRC-Building**	**IRC Mechanical**	**IRC Plumbing**
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2012 - 2014 STAFF SECRETARIES (continued)

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CP# 28-05 CODE DEVELOPMENT

Approved: 9/24/05
Revised: 12/6/12

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

1.0 Introduction

1.1 Purpose: The purpose of this Council Policy is to prescribe the Rules of Procedure utilized in the continued development and maintenance of the International Codes (Codes).

1.2 Objectives: The ICC Code Development Process has the following objectives:

1.2.1 The timely evaluation and recognition of technological developments pertaining to construction regulations.
1.2.2 The open discussion of proposals by all parties desiring to participate.
1.2.3 The final determination of Code text by public officials actively engaged in the administration, formulation or enforcement of laws, ordinances, rules or regulations relating to the public health, safety and welfare and by honorary members.

1.3 Code Publication: The ICC Board of Directors (ICC Board) shall determine the title and the general purpose and scope of each Code published by the ICC.

1.3.1 Code Correlation: The provisions of all Codes shall be consistent with one another so that conflicts between the Codes do not occur. Where a given subject matter or code text could appear in more than one Code, the ICC Board shall determine which Code shall be the primary document, and therefore which code development committee shall be responsible for review and maintenance of the code text. Duplication of content or text between Codes shall be limited to the minimum extent necessary for practical usability of the Codes, as determined in accordance with Section 4.4.

1.4 Process Maintenance: The review and maintenance of the Code Development Process and these Rules of Procedure shall be by the ICC Board. The manner in which ICC codes are developed embodies core principles of the organization. One of those principles is that the final content of ICC codes is determined by a majority vote of the governmental and honorary members. It is the policy of the Board that there shall be no change to this principle without the affirmation of two-thirds of the governmental and honorary members responding.

1.5 Secretariat: The Chief Executive Officer shall assign a Secretariat for each of the Codes. All correspondence relating to code change proposals and public comments shall be addressed to the Secretariat.

1.6 Recording: Individuals requesting permission to record any meeting or hearing, or portion thereof, shall be required to provide the ICC with a release of responsibility disclaimer and shall acknowledge that ICC shall retain sole ownership of the recording, and that they have insurance coverage for liability and misuse of recording materials. Equipment and the process used to record shall, in the judgment of the ICC Secretariat, be conducted in a manner that is not disruptive to the meeting. The ICC shall not be responsible for equipment, personnel or any other provision necessary to accomplish the videotaping. An unedited copy of the recording shall be forwarded to ICC within 30 days of the meeting. Recordings shall not otherwise be copied, reproduced or distributed in any manner. Recordings shall be returned to ICC or destroyed upon the request of ICC.

2.0 Code Development Cycle

2.1 Intent: The code development cycle shall consist of the complete consideration of code change proposals in accordance with the procedures herein specified, commencing with the deadline for submission of code change proposals (see Section 3.5) and ending with publication of final action on the code change proposals (see Section 7.6).

2.2 New Editions: The ICC Board shall determine the schedule for publishing new editions of the Codes. Each new edition shall incorporate the results of the code development activity since the last edition.

2.3 Supplements: The results of code development activity between editions may be published.

2.4 Emergency Action Procedures:

2.4.1 Scope: Emergency actions are limited to those issues representing an immediate threat to health and safety that warrant a more timely response than allowed by the Code Development Process schedule.

2.4.2 Initial Request: A request for an emergency action shall be based upon perceived threats to health and safety and shall be reviewed by the ICC Codes and Standards Council for referral to the Board of Directors for action with their analysis and recommendation.

2.4.3 Board and Member Action: In the event that the ICC Board determines that an emergency amendment to any Code or supplement thereto is warranted, the same may be adopted by the ICC Board. Such action shall require an affirmative vote of at least two-thirds of the ICC Board.

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

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

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

3.0 Submittal of Code Change Proposals

3.1 Intent: Any interested person, persons or group may submit a code change proposal which will be duly considered when in conformance to these Rules of Procedure.

3.2 Withdrawal of Proposal: A code change proposal may be withdrawn by the proponent (WP) at any time prior to Final Action Consideration of that proposal. A withdrawn code change proposal shall not be subject to a public hearing, motions, or Final Action Consideration.

3.3 Form and Content of Code Change Submittals: Each code change proposal shall be submitted separately and shall be complete in itself. Each submittal shall contain the following information:

3.3.1 Proponent: Each code change proposal shall include the name, title, mailing address, telephone number, and email address of the proponent. Email addresses shall be published with the code change proposals unless the proponent otherwise requests on the submittal form.

3.3.1.1 If a group, organization or committee submits a code change proposal, an individual with prime responsibility shall be indicated.

3.3.1.2 If a proponent submits a code change on behalf of a client, group, organization or committee, the name and mailing address of the client, group, organization or committee shall be indicated.

3.3.2 **Code Reference:** Each code change proposal shall relate to the applicable code sections(s) in the latest edition of the Code.

3.3.2.1 If more than one section in the Code is affected by a code change proposal, appropriate proposals shall be included for all such affected sections.

3.3.2.2 If more than one Code is affected by a code change proposal, appropriate proposals shall be included for all such affected Codes and appropriate cross referencing shall be included in the supporting information.

3.3.3 **Multiple code change proposals to a code section.** A proponent shall not submit multiple code change proposals to the same code section. When a proponent submits multiple code change proposals to the same section, the proposals shall be considered as incomplete proposals and processed in accordance with Section 4.3. This restriction shall not apply to code change proposals that attempt to address differing subject matter within a code section.

3.3.4 **Text Presentation:** The text proposal shall be presented in the specific wording desired with deletions shown struck out with a single line and additions shown underlined with a single line.

3.3.4.1 A charging statement shall indicate the referenced code section(s) and whether the proposal is intended to be an addition, a deletion or a revision to existing Code text.

3.3.4.2 Whenever practical, the existing wording of the text shall be preserved with only such deletions and additions as necessary to accomplish the desired change.

3.3.4.3 Each proposal shall be in proper code format and terminology.

3.3.4.4 Each proposal shall be complete and specific in the text to eliminate unnecessary confusion or misinterpretation.

3.3.4.5 The proposed text shall be in mandatory terms.

3.3.5 **Supporting Information:** Each code change proposal shall include sufficient supporting information to indicate how the proposal is intended to affect the intent and application of the Code.

3.3.5.1 **Purpose:** The proponent shall clearly state the purpose of the proposed code change (e.g. clarify the Code; revise outdated material; substitute new or revised material for current provisions of the Code; add new requirements to the Code; delete current requirements, etc.)

3.3.5.2 **Reasons:** The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.

3.3.5.3 **Substantiation:** The proponent shall substantiate the proposed code change based on technical information and substantiation. Substantiation provided which is reviewed in accordance with Section 4.2 and determined as not germane to the technical issues addressed in the proposed code change may be identified as such. The proponent shall be notified that the proposal is considered an incomplete proposal in accordance with Section 4.3 and the proposal shall be held until the deficiencies are corrected. The proponent shall have the right to appeal this action in accordance with the policy of the ICC Board. The burden of providing substantiating material lies with the proponent of the code change proposal All substantiating material published by ICC is material that has been provided by the proponent and in so publishing ICC makes no representations or warranties about its quality or accuracy.

3.3.5.4 **Bibliography:** The proponent shall submit a bibliography of any substantiating material submitted with the code change proposal. The bibliography shall be published with the code change and the proponent shall make the substantiating materials available for review at the appropriate ICC office and during the public hearing.

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

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

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

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

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

3.6.1 **Code References:**

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

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

3.6.2 **Standard Content:**

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

3.6.2.2 The standard shall be appropriate for the subject covered.

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

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

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

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

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

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

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

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

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

3.6.3 Standard Promulgation:

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

3.6.3.2 The standard shall be developed and maintained through a consensus process such as ASTM or ANSI.

4.0 Processing of Proposals

4.1 Intent: The processing of code change proposals is intended to ensure that each proposal complies with these Rules of Procedure and that the resulting published proposal accurately reflects that proponent's intent.

4.2 Review: Upon receipt in the Secretariat's office, the code change proposals will be checked for compliance with these Rules of Procedure as to division, separation, number of copies, form, language, terminology, supporting statements and substantiating data. Where a code change proposal consists of multiple parts which fall under the maintenance responsibilities of different code committees, the Secretariat shall determine the code committee responsible for determining the committee action in accordance with Section 5.6.

4.3 Incomplete Proposals: When a code change proposal is submitted with incorrect format, without the required information or judged as not in compliance with these Rules of Procedure, the Secretariat shall notify the proponent of the specific deficiencies and the proposal shall be held until the deficiencies are corrected, with a final date set for receipt of a corrected submittal. If the Secretariat receives the corrected proposal after the final date, the proposal shall be held over until the next code development cycle. Where there are otherwise no deficiencies addressed by this section, a proposal that incorporates a new referenced standard shall be processed with an analysis of referenced standard's compliance with the criteria set forth in Section 3.6.

4.4 Editorial: The Chief Executive Officer shall have the authority at all times to make editorial and format changes to the Code text, or any approved changes, consistent with the intent, provisions and style of the Code. An editorial or format change is a text change that does not affect the scope or application of the code requirements.

4.5 Updating Standards:

4.5.1 Standards referenced in the I-Codes: The updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee in accordance with these full procedures except that the deadline for availability of the updated standard and receipt by the Secretariat shall be December 1 of the third year of each code cycle. The published version of the new edition of the Code which references the standard will refer to the updated edition of the standard. If the standard is not available by the deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued Multiple standards to be updated may be included in a single proposal.

4.6 Preparation: All code change proposals in compliance with these procedures shall be prepared in a standard manner by the Secretariat and be assigned separate, distinct and consecutive numbers. The Secretariat shall coordinate related proposals submitted in accordance with Section 3.3.2 to facilitate the hearing process.

4.7 Publication: All code change proposals shall be posted on the ICC website at least 30 days prior to the public hearing on those proposals and shall constitute the agenda for the public hearing. Code change proposals which have not been published shall not be considered.

5.0 Public Hearing

5.1 Intent: The intent of the public hearing is to permit interested parties to present their views including the cost and benefits on the code change proposals on the published agenda. The code development committee will consider such comments as may be presented in the development of their action on the disposition of such proposals. At the conclusion of the code development committee deliberations, the committee action on each code change proposal shall be placed before the hearing assembly for consideration in accordance with Section 5.7.

5.2 Committee: The Code Development Committees shall be appointed by the Board of Directors.

5.2.1 Chairman/Moderator: The Chairman and Vice-Chairman shall be appointed by the Steering Committee on Councils from the appointed members of the committee. The ICC President shall appoint one or more Moderators who shall act as presiding officer for the public hearing.

5.2.2 Conflict of Interest: A committee member shall withdraw from and take no part in those matters with which the committee member has an undisclosed financial, business or property interest. The committee member shall not participate in any committee discussion or any committee vote on the matter in which they have an undisclosed interest. A committee member who is a proponent of a proposal shall not participate in any committee discussion on the matter or any committee vote. Such committee member shall be permitted to participate in the floor discussion in accordance with Section 5.5 by stepping down from the dais.

5.2.3 Representation of Interest: Committee members shall not represent themselves as official or unofficial representatives of the ICC except at regularly convened meetings of the committee.

5.2.4 Committee Composition: The committee may consist of representation from multiple interests. A minimum of thirty-three and one-third percent (33.3%) of the committee members shall be regulators.

5.3 Date and Location: The date and location of each public hearing shall be announced not less than 60 days prior to the date of the public hearing.

5.4 General Procedures: *The Robert's Rules of Order* shall be the formal procedure for the conduct of the public hearing except as a specific provision of these Rules of Procedure may otherwise dictate. A quorum shall consist of a majority of the voting members of the committee.

5.4.1 Chair Voting: The Chairman of the committee shall vote only when the vote cast will break a tie vote of the committee.

5.4.2 Open Meetings: Public hearings of the Code Development Committees are open meetings. Any interested person may attend and participate in the Floor Discussion and Assembly Consideration portions of the hearing. Only eligible voters (see Section 5.7.4) are permitted to vote on Assembly Considerations. Only Code Development Committee members may participate in the Committee Action portion of the hearings (see Section 5.6). Participants shall not advocate a position on specific code changes with Committee Members other than through the methods provided in this policy.

5.4.3 Presentation of Material at the Public Hearing: Information to be provided at the hearing shall be limited to verbal presentations and modifications submitted in accordance with Section 5.5.2. Each individual presenting information at the hearing shall state their name and affiliation, and shall identify any entities or individuals they are representing in connection with their testimony. Audio-visual presentations are not permitted. Substantiating material submitted in accordance with Section 3.3.4.4 and other material submitted in response to a code change proposal shall be located in a designated area in the hearing room and shall not be distributed to the code development committee at the public hearing.

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

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

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

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

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

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

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

5.5.1 **Discussion Order:**

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

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

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

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

1. is not legible, unless not required to be written in accordance with Section 5.5.2.1; or
2. changes the scope of the original proposal; or
3. is not readily understood to allow a proper assessment of its impact on the original proposal or the code.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6.0 Public Comments

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

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

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

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

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

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

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

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

6.4.3 **Multiple public comments to a code change proposal.** A proponent shall not submit multiple public comments to the same code change proposal. When a proponent submits multiple public comments to the same code change proposal, the public comments shall be considered as incomplete public comments and processed in accordance with Section 6.5.1. This restriction shall not apply to public comments that attempt to address differing subject matter within a code section.

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

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

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

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

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

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

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

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

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

7.0 Final Action Consideration

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

7.2 **Agenda:** The final action consent agenda shall be comprised of proposals which have neither an assembly action nor public comment. The agenda for public testimony and individual consideration shall be comprised of proposals which have a successful assembly action or public comment (see Sections 5.7 and 6.0).

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

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

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

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

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

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

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

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

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

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

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

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

7.3.8.3 Motions for Modifications: Whenever a motion under consideration is for

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

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

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

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

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

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

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

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

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

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

8.0 Appeals

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

2012-2014 ICC CODE DEVELOPMENT CYCLE
UPDATES TO THE 2013
REPORT OF THE COMMITTEE ACTION HEARINGS

NOTE: Changes/Corrections are highlighted.

International Energy Conservation Code - Commercial

CE299-13

Committee Action: Approved as Modified

Modify the proposal as follows:

3. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

(Balance of the proposal is unchanged.)

Committee Reason: The modification was approved to correct the readability of the sentence. The turning off of power when sleeping units are occupied will save significant energy.

Assembly Action: None

International Existing Building Code

EB15-13

Committee Action: Approved as Modified

Modify the proposal as follows:

702.4 Window opening control devices. In Group R-2 or R-3 buildings containing dwelling units and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. In Group R-2 or R-3 buildings containing dwelling units, the top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor, or in one- and two-family dwellings and townhouses regulated by the *International Residential Code*, the top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by the *International Building Code*.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

702.5 Emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 of the *International Building Code* and Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 of the *International Residential Code* accordingly provided the replacement window ~~meets the following conditions: 1. The replacement window~~ is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.

~~2. The replacement of the window is not part of a change of occupancy.~~

Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*

Committee Reason: The proposal was preferred to EB9-13. The provisions were seen necessary to address the replacement windows with regard to fall safety and emergency escape and rescue openings in existing buildings. The proposal was similar to EB9-13 but did not add revisions to Section 602.3 or one and two family dwelling. One and two family dwellings can be addressed by the IEBC. The modification adds clarification that the window opening control device requirement has a different applicability to one and two family dwellings than Group R-2 or R-3 buildings. One and two family dwellings are permitted to have a window opening as low as 24 inches above the finished floor versus 36 inches. This is more consistent with the IRC as a trigger for window opening control devices.

Assembly Action: None

International Fire Code

F241-13

Committee Action: Approved as Modified

Modify the proposal as follows:

1105.5.2 Smoke barriers. Smoke barriers shall be constructed in accordance with Section 709 of the *International Building Code*.

Exceptions:

1. Existing smoke barriers ~~with a minimum of 1/2 - hour fire-resistance rating~~ are permitted to remain where the existing smoke barrier has a minimum fire resistance rating of ½ hour.
2. Smoke barriers shall be permitted to terminate at an atrium enclosure in accordance with Section 404.6 of the *International Building Code.*

1105.5.3 Opening protective. Openings in smoke barriers shall be protected in accordance with Section 716 of the *International Building Code.* Opening protective shall have ~~a with~~ a minimum fire-pretection-rating of 1/3 hours.

Exception: Existing wired glass vision panels in doors shall be permitted to remain.

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee agreed with the proponent that the code change reflects an important and needed coordination effort to correlate the IFC with Federal Center for Medicaid and Medicare Services (CMS) healthcare regulations with which all facilities must now comply and that it will eliminate costly conflicting requirements among different codes applicable to such facilities. The modification clarifies the applicability of the exception.

Assembly Action: None

IRC – Mechanical

RM97-13

PART I – IRC – Mechanical
Committee Action: **Disapproved**

Committee Reason: The proponent asked for disapproval because the definitions were addressed in other proposals.

Assembly Action: **None**

PART II – IRC – Building
Committee Action: **Approved as Modified**

Replace the proposal as follows:

R324.3.1.1 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. ~~Roof structures that provide support for photovoltaic panel systems shall be designed for live load L_R for the load case when the photovoltaic panel system is not present.~~ The exclusion of the roof live load in the area(s) covered by the panels does not preclude the design of building roofs from being designed for roof live load requirements for the loading condition where the photovoltaic panel system may be removed or not installed.

Committee Reason: Approval was based upon the proponent's published reason and the modification. The modification clarifies how to design the PV system for roof live load and correlates with previous action on RM98-13, Part II.

Assembly Action: **None**

2013 PUBLIC COMMENT HEARING SCHEDULE
October 2 – 10, 2013
Atlantic City Convention Center, Atlantic City, NJ

The Public Comment Hearings (formerly called Final Action Hearings) will start at 1:00 pm on Wednesday, October 2, 2013. Unless noted by "Start no earlier than X am/pm," the hearing on each code will begin immediately upon completion of the hearings for the prior code. This includes moving the hearing for the specific code up or back from the day indicated based on hearing progress. Actual start times for the various codes cannot be stipulated due to uncertainties in hearing progress.

The schedule anticipates that the hearings will be completed no later than 12 pm on Thursday, October 10th. This may require adjustments to the daily start/end times based on hearing progress. Be sure to review the published hearing order for code changes that are heard with a code other than that indicated by the code change prefix (see note 4).

Wednesday October 2	**Thursday October 3**	**Friday October 4**	**Saturday October 5**	**Sunday October 6**
Start 1 pm	**Start 8 am**	**Start 8 am**	**Start 8 am**	**Start 8 am**
ADMIN **ISPSC** **IPMZC** **IEBC**	**IEBC** **IFC** **IRC - B**	**IRC - B** **IRC – M**	**IRC – P** **IECC – R/ IRC – E** Start no earlier than 1:00 pm	**IECC – R/ IRC - E**
End 5 pm	**End 10 pm**	**End 10 pm**	**End 10 pm**	**End 10 pm**

Monday October 7	**Tuesday October 8**	**Wednesday October 9**	**Thursday October 10**
Start 8 am	**Start 8 am**	**Start 8 am**	**Start 8 am**
IECC – R/ IRC – E **IECC - C**	**IECC - C**	**IECC - C**	**IECC - C**
End 10 pm	**End 10 pm**	**End 10 pm**	**End 12 pm**

Notes:
1. Daily start and end hearing times are subject to change based on progress.
2. Mid-morning, lunch, mid-afternoon and dinner breaks to be announced.
3. Due to the uncertainties in the hearing process, start times indicated as "Start no earlier than x am/pm" are conservatively estimated and are not intended to be scheduled targets.
4. Consult the hearing order for code changes to be heard with a code other than the code under which the code change is designated.
5. A listing of the codes is on the second page of this schedule.

Codes: (be sure to consult the Cross Index of Proposed Code Changes with Public Comments for changes heard with a different code)

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

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

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

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

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

IPMZC: International Property Maintenance and Zoning Codes (no changes received to the IZC)

IRC – B: Building provisions in Chapters 1 – 10 of the International Residential Code (IRC)

IRC – M: Mechanical provisions in the IRC

IRC – P: Plumbing provisions in the IRC

ISPSC: International Swimming Pool and Spa Code

TENTATIVE HEARING ORDER
FOR EACH INDIVIDUAL CONSIDERATION AGENDA

Note: Code changes to be heard out of numerical order or to be heard with a different code designation are indented. Be sure to review the cross index on page xxix for code change which affect codes other than those under their respective code change number prefix.

<u>IADMIN</u>
<u>(See page 1)</u>

- ADM5-13 Part I
- ADM6-13 Part I
- ADM6-13 Part II
- ADM11-13
- ADM12-13
- ADM14-13
- ADM16-13
- ADM18-13 Part I
- ADM18-13 Part III
- ADM30-13 Part II
- ADM34-13
- ADM38-13
- ADM42-13
- ADM46-12
- ADM47-13 Part IV
- AD55-13 Part II
- ADM60-13 Part V
- ADM61-13
- ADM62-13

<u>ISPSC</u>
<u>(See page 2527)</u>

- SP1-13
- SP3-13
- SP4-13
- SP12-13
- SP13-13
- SP19-13, Part I
- SP19-13, Part II
- SP19-13, Part III
- SP26-13
- SP33-13
- SP36-13
- SP40-13
- SP42-13
- SP44-13
- SP47-13
- SP50-13
- SP59-13

<u>IPMC</u>
<u>(See page 1583)</u>

- PM3-13
- PM6-13
  - ADM37-13
  - EB63-13
  - RB8-13
- PM9-13
- PM10-13
- PM13-13
- PM16-13

<u>IEBC</u>
<u>(See page 1169)</u>

  - ADM3-13
- EB3-13
- EB8-13
- EB10-13
- EB12-13
- EB15-13
- EB16-13
- EB17-13
- EB21-13
  - EB5-13
- EB24-13
- EB29-13
- EB30-13
- EB32-13
- EB33-13
- EB35-13
- EB38-13
- EB42-13
- EB43-13
  - EB6-13
  - EB7-13
- EB45-13
- EB46-13
- EB49-13
- EB52-13
- EB53-13
- EB57-13
- EB59-13

<u>IFC</u>
<u>(See page 132)</u>
ICC PERFORMANCE

- PC1-13

WILDLAND-URBAN
<u>(See page 2567)</u>

- WUIC2-13
- WUIC3-13
- WUIC4-13
- WUIC5-13

FIRE CODE
<u>(See page 1265)</u>

  - G1-13
- F285-13
- F295-13
  - G9-13
- F300-13
- F310-13
  - F6-13
  - G14-13
- F325-13
- F327-13
- F328-13
- F332-13
- F333-13
- F13-13
- F16-13
- F17-13
- F20-13
- F23-13
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- F30-13
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- F138-13
- F139-13
- F148-13
- F149-13
- F150-13
- F151-13
- F154-13
- F158-13
- F159-13
- F162-13, Part I
- F162-13, Part II
- F164-13
- F169-13
- F172-13
- F176-13
- F178-13
  - F360-13
- F192-13
- F196-13
- F203-13
- F204-13
- F205-13
- F210-13
- F212-13, Part I
- F212-13, Part II
  - EB26-13
- F218-13
- F222-13
- F226-13
- F228-13
- F229-13
- F239-13
- F241-13
  - F354-13
- F245-13
- F248-13
- F250-13
- F252-13

IECC – Residential (See page 792)

IECC – Commercial (See page 144)

CE131-13
CE136-13
CE137-13
CE138-13
CE142-13
CE143-13
CE145-13
CE149-13
CE152-13
CE153-13
CE156-13
CE161-13 Part I
CE161-13 Part II
CE164-13
CE165-13
CE166-13
CE167-13
CE168-13
CE177-13 Part I
CE177-13 Part II
CE179-13 Part I
CE179-13 Part II
CE180-13
CE183-13
CE190-13
CE191-13
CE192-13
CE194-13
CE198-13
CE200-13
CE201-13
CE212-13
CE214-13
CE215-13
CE220-13
CE223-13
CE227-13
CE230-13 Part I
CE230-13 Part II
CE232-13
CE239-13
CE240-13
CE241-13
CE244-13
CE245-13
CE246-13
CE250-13
CE251-13
CE252-13
CE254-13
CE255-13
CE257-13
CE258-13
CE259-13
CE260-13
CE270-13, Part I
CE271-13, Part I
CE274-13
CE275-13
CE278-13 Part I
CE279-13 Part I
CE279-13 Part II
CE280-13 Part I
CE280-13 Part II
CE280-13 Part III
CE49-13 Part I
CE49-13 Part II
CE49-13 Part III
CE282-13 Part I
CE282-13 Part II
CE283-13 Part I
CE283-13 Part III
CE285-13 Part I
CE286-13
CE287-13
CE289-13
CE292-13
CE293-13
CE294-13
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CE309-13
CE310-13
CE312-13
CE319-13
CE323-13
CE326-13
CE328-13
CE329-13
CE331-13
CE332-13
CE333-13
CE337-13
CE340-13
CE343-13
CE344-13
PC2-13
PC3-13
CE350-13
CE355-13
CE356-13
CE357-13

2013 ICC CODE DEVELOPMENT CYCLE
CROSS INDEX OF PROPOSED CODE CHANGES WITH PUBLIC COMMENTS

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

Listed in this index are proposed code changes that include sections or codes other than those associated with that code group. For example, International Building Code Section 402.7.3 is proposed for revision in code change F59-13. The International Building Code Chapter 4 is generally the responsibility of the IBC General Code Committee as listed in the table of Staff Secretaries. However, Section 402.7.3 has an [F] designation which means it is mentioned by the IFC Code Committee. It is therefore identified in this index. Another example is Section C404.7 of the International Energy Conservation Code-Commercial Provisions (IECC-C). The IECC-C is maintained by the IECC Commercial code committee, and the proposed revision to Section C404.7 was considered for revision in code change SP19-13, Part II. In some instances, there are other subsections that are revised by an identified code change that are not included in the list. For example, numerous sections in Chapter 9 of the International Building Code would be revised by the proposed changes to Chapter 9 of the IFC. This was done to keep the list brief enough for easy reference.

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

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

PREFIX	**PROPOSED CHANGE GROUP (see Table of Contents on page xxxiii for location)**
ADM	**International Codes Administrative Provisions**
CE	**International Energy Conservation Code—Commercial Provisions**
RE	**International Energy Conservation Code—Residential Provisions**
EB	**International Existing Building Code**
F	**International Fire Code**
SP	**International Swimming Pool and Spa Code**

INTERNATIONAL BUILDING CODE

Section #	Code Change #
101.3	ADM6 Part I
101.4.7 (New)	ADM11
101.4.7 (New)	ADM12
103.2	ADM18 Part I
107.1.1 (New)	ADM42
107.3.4.1	ADM46
202	ADM5 Part I, ADM11, ADM12, ADM46, ADM51 Part I, ADM52 Part I, F6, F111
402.7.3	F59
403.3	F139
403.3.3	F139
403.3.4	F139
403.4.8 through 403.4.8.2	F59
403.4.8.2, 403.4.8.3 (New)	F55
403.4.9, 403.4.9.1	F59
404.7	F59
405.8 through 405.8.2	F59
405.9, 405.9.1	F59
412.3.4	F59
408.4.2	F59
414.5.3.1, 414.5.3.2 (New)	F59
414.5.4	F59
414.7.4 (New)	F59
415.10.10, 415.10.10.1	F59
421.8	F59
806.1	F109, F111
806.1.1	F109
806.1.2	F109
806.2	F109
806.3	F109
Chapter 9	See IFC Proposed Changes to IFC Chapter 9
901.5	ADM22 Part I
902 through 910; 912, 913	SEE IFC CODE CHANGES
904.5 through 904.10	ADM43, Part II (Heard by IFC Committee)
909.20.6.2	F59
909.21.5	F59
2702.2.1 through 2702.2.3	F59
2702.2.4 through 2704.2.8	F59
2702.2.14	F59
2702.2.15 through 2702.2.18	F59
2702.2.19, 2702.2.20	F59
2702.2.21	F59
2702.2.22 through 2702.2.24	F58

ICC PERFORMANCE CODE

Section #	Code Change #
101.2.2	ADM6 Part I

INTERNATIONAL ENERGY CONSERVATION CODE—COMMERCIAL PROVISIONS

Section #	Code Change #
C202	ADM52 Part II, ADM55 Part II, ADM60 Part II
C404.7	SP19 Part II
C407.3	ADM52 Par II

INTERNATIONAL ENERGY CONSERVATION CODE—RESIDENTIAL PROVISIONS

Section #	Code Change #
R101.4	CE4 Part II
R101.4.2	CE7 Part II
R101.4.4	CE20 Part II
R101.4.5	CE20 Part II
R101.5.1	CE22 Part II
R102.1	CE28 Part II, CE29 Part II
R102.1.1	CE29 Part II, CE31 Part II, CE32 Part II, CE33 Part II,
R103.2	CE35 Part II
R103.2.1 (New)	CE35 Part II
R103.2.1 (New)	CE37 Part II
R103.2.1.1	CE35 Part II
R103.2.1.2	CE35 Part II
R103.2.2 (New)	CE35 Part II
R103.2.2.1 (New)	CE35 Part II
R103.2.2.2 (New)	CE35 Part II
R103.2.3 (New)	CE35 Part II
R103.2.4 (New)	CE35 Part II
R103.2.5 (New)	CE35 Part II
R103.3	CE35 Part II
R103.4	ADM30 Part II
R104.1	CE38 Part II
R104.1.1	CE39 Part II
R104.2 (New)	CE38 Part II
R104.2	CE35 Part II
R104.2.1 (New)	CE39 Part II
R104.2.2 (New)	CE39 Part II
R104.3	CE38 Part II
R104.3.1	CE40 Part II
R104.3 (New)	CE39 Part II

R104.3.1 (New)	CE38 Part II
R104.3.1 (New)	CE39 Part II
R104.3.2 (New)	CE38 Part II
R104.3.3 (New)	CE38 Part II
R104.3.4 (New)	CE38 Part II
R104.3.5 (New)	CE38 Part II
R104.3.6 (New)	CE38 Part II
R104.4	CE39 Part II
R104.5	CE38 Part II, CE39 Part II, CE41 Part II
R104.5.1 (New)	CE41 Part II
R104.6	CE39 Part II
R104.7	CE39 Part II
R104.8	CE38 Part II, CE39 Part II
R104.8.1	CE39 Part II
R106.2	CE43 Part II
R108.4	CE44 Part II
R202	ADM51 Part III, ADM52 Part III, ADM53 Part III, ADM55 Part III, ADM57 Part III, ADM60 Part III, CE4 Part II, CE7 Part II, CE8 Part II, CE9 Part II, CE15 Part II, CE35 Part II, CE41 Part II, CE46 Part II, CE47 Part II, CE48 Part II, CE49 Part III, CE52 Part II, CE58 Part II, CE59 Part II
Table R402.1.1	RB96 Part II
R402.1.2	CE177 Part II
R402.1.3.1 (New)	CE84 Part II
R402.2.3	CE127 Part II
R402.3.2	CE161 Part II
R402.3.6	CE4 Part II
R403.4.1	CE280 Part III
R403.4.1.1 (New)	CE280 Part III
R403.4.1.2 (New)	CE280 Part III
Table R403.4.2	CE273 Part III
R403.4.3	CE283 Part II
R403.9	SP19 Part III
R404.1	CE285 Part II
R404.2.5	CE127 Part II
R403.9	SP19 Part III
Chapter 5(RE) (New)	CE4 Part II
Chapter 5(RE) (New)	CE34 Part II

INTERNATIONAL EXISTING BUILDING CODE

103.2	ADM18 Part I
106.2.6 (New)	ADM37
106.3.4	ADM46

804.2.2.2 (New)	F212 Part II
804.4.5	F59 Part II

INTERNATIONAL FIRE CODE

101.3	ADM6 Part I
102.3	ADM14
102.3.1 (New)	ADM14
102.3.2 (New)	ADM14
102.5	ADM16
103.2	ADM18 Part I
105.7.12 (New)	ADM34
106.3 (New)	ADM38
113.2	ADM38
202	ADM5 Part I, ADM51 Part I, ADM52 Part II, ADM55 Part I
1030.7	PM13

INTERNATIONAL FUEL GAS CODE

101.4	ADM6 Part I
103.2	ADM18 Part I
108.2	ADM5 Part I
412.6	F250
412.8	F252

INTERNATIONAL MECHANICAL CODE

101.3	ADM6 Part I
103.2	ADM18 Part I
202	ADM52 Part I
502.7.3.3.3	F261
513.11	F59
513.11.1 (New)	F59
513.12.1	F192

INTERNATIONAL PLUMBING CODE

101.3	ADM6 Part I
103.2	ADM18 Part I
202	CE49 Part II, CE282 Part II
607.2.1	CE279 Part II, CE280 Part II
607.2.1.1 (New)	CE282 Part II
607.2.1.1 (New)	RE136
607.5	RE129, CE270 Part II, CE271 Part II

INTERNATIONAL PRIVATE SEWAGE DISPOSAL CODE

101.6	ADM6 Part I
103.2	ADM18 Part I

INTERNATIONAL PROPERTY MAINTENANCE CODE

101.2	ADM6 Part I

102.2	ADM5 Part I,
102.3	ADM5 Part I
103.2	ADM5 Part I, ADM18 Part I
104.2	ADM5 Part I
105.6	ADM5 Part I
106.2	ADM5 Part I
106.3	ADM5 Part I
106.4	ADM5 Part I
106.5	ADM5 Part I
107.1	ADM5 Part I
107.3	ADM5 Part I
107.4	ADM5 Part I
107.5 (New)	ADM5 Part I
108.1	ADM5 Part I, ADM50 Part I
108.1.2	ADM5 Part I
108.1.3	ADM5 Part I
108.1.5	ADM5 Part I
108.2	ADM5 Part I, ADM22 Part I
108.3	ADM5 Part I
108.4	ADM5 Part I
108.4.1	ADM5 Part I
108.5	ADM5 Part I
108.6	ADM5 Part I
109.1	ADM5 Part I
109.3	ADM5 Part I
109.5	ADM5 Part I
110.1	ADM5 Part I
110.2	ADM5 Part I
110.4	ADM5 Part I
111.2	ADM5 Part I, ADM22 Part I
111.5	ADM5 Part I
111.6	ADM5 Part I
111.7	ADM5 Part I
111.8	ADM5 Part I
112.3	ADM5 Part I
112.4	ADM5 Part I
202	ADM5 Part I
704.5 (New)	F162

INTERNATIONAL RESIDENTIAL CODE

R103.2	ADM18 Part II
R202	ADM5 Part II, ADM55 Part IV, ADM61, CE48 Part III, CE49 Part III, RM31, RM37, RM77, RM97, RM98 Part I
R303.5	RM37 Part II
R303.5.1	RM37 Part II
R303.5.1	RM37 Part II
R314.5 through R314.5.3 (New)	F165 Part II
R902.1	RM98 Part II
R902.3	RM98 Part II
R902.4	RM98 Part II
R902.16	RM98 Part II
R902.16.1	RM98 Part II
R905.16.2	RM98 Part II
R905.16.3	RM98 Part II
R908 (New)	RM98 Part II
Chapter 11	Changes to Chapter 11 of the IRC – see agenda for IECC-R
M2201.6	RB193
P2903.11 (New)	CE283 Part III
P2905.1 (New)	RE129
P2905.1 (New)	RE136
P2905.1 (New)	RE137
P2905.1 (New)	RE138

INTERNATIONAL SWIMMING POOL AND SPA CODE

103.2	ADM18 Part III
202	ADM55 Part V, ADM60 Part V

INTERNATIONAL WILDLAND-URBAN INTERFACE CODE

404.10.3	F59

2013 PUBLIC COMMENTS TO THE PROPOSED CHANGES FOR THE 2012 INTERNATIONAL CODES

ADM3-13
IEBC [A] 101.2

Proposed Change as Submitted

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

Revise the International Existing Building Code as follows:

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

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

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

Cost Impact: None.

[A] 101.2-ADM (IEBC)-TEPE

Committee Action Hearing Results

HEARD BY THE IEBC COMMITTEE
Committee Action: **Disapproved**

The following is errata that was not posted to the ICC website.

Revise the proposal as follows:

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

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

Committee Reason: The IEBC does have provisions that apply buildings covered in the IRC. The IEBC also includes an appendix specific to housing, so this exception would not be appropriate. The IRC also references the IEBC, so if the IRC is intended to include separate existing building criteria this issue needs to be much more broadly addressed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jerry R. Tepe, FAIA, JRT-AIA Architect, representing American Institute of Architects, requests Approval as Submitted.

Commenter's Reason: With respect to the committee, the published reasons for disapproval are all erroneous:

1. "The IEBC does have provisions that apply buildings covered in the IRC."
   The few references are generally exceptions to structural and energy provisions and code or adding the IRC to the IBC listing; correlation can remove these if this proposal is accepted. Most of these references were added late in the drafting process or have been recently added, in my opinion, in the mistaken idea that the IEBC was intended to apply to one- and two-family residences and townhouses. Most, if not all, are contained in Appendix J of the IRC.
   If this proposal is not accepted, there are numerous other sections of the IEBC that would require similar exceptions and/or additions to make it truly a complete code pertaining to one- and two-family residences and townhouses.
2. "The IEBC also includes an appendix specific to housing, so this exception would not be appropriate."
   I assume the referenced appendix is B103 for supplementary accessibility requirements for dwelling units and sleeping units. This is only for communication devices and refers back to requirements of the IBC, not the IRC. Accessibility is generally not required in one- and two-family residences.
3. "The IRC also references the IEBC."
   Not that a word search can find nor is it included in Chapter 44, Referenced Standards.

One opponent stated "If a jurisdiction has IEBC but did not have IRC, if the exception went in, you would have nothing." I assert that if a jurisdiction does not adopt the IRC, using the IEBC for requirements for existing one-and two-family residences and townhouses seems to be a hidden method of code enforcement. If a jurisdiction has concerns for one- and two-family residences and townhouses, they can and probably should adopt the IRC and Appendix J. As the opponent states, existing buildings would be required to comply with provisions of the IRC, while new construction would not.

Another opponent spoke about IRC Appendix J not being well accepted. That is why the proposed exception does not mandate compliance with the IRC and/or Appendix J, only that the IEBC is not applicable to one- and two-family residences and townhouses. A jurisdiction would need to specifically adopt the appendix as well as the IRC for this to be applicable. If Appendix J is not well accepted, as noted above, the use of the IEBC becomes a hidden method of code enforcement as many of the requirements are the same or similar.

Unlike the IBC, the IRC does not reference the IEBC for existing buildings. In Chapter 34 of the IBC (soon to be removed), the IEBC is referenced as an alternative means of compliance (§3401.6). Additionally, the administrative provisions of the IRC do not reference the IEBC (§R102.4 and §R102.7).

It has long been the ICC position that requirements for one- and two-family residences and townhouses should all be contained in the IRC, therefore, to me, this proposal and the correlation changes, follows that concept.

ADM3-13

Final Action: AS AM AMPC____ D

ADM5-13, Part I

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

NOTE: *PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART II IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART I.*

Proposed Change as Submitted

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

Proponent: Karen Blake, representing International Municipal Lawyers Association

PART I – IBC; IFC; IPMC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

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

Revise the International Fire Code as follows:

IFC SECTION 202
GENERAL DEFINITIONS

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

Revise the International Property Maintenance Code as follows:

IPMC SECTION 202
GENERAL DEFINITIONS

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

DAYS. Calendar days.

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

IPMC SECTION 102
APPLICABILITY

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

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

IPMC SECTION 103
DEPARTMENT OF PROPERTY MAINTENANCE INSPECTION

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

IPMC SECTION 104
DUTIES AND POWERS OF THE CODE OFFICIAL

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

IPMC SECTION 105
APPROVAL

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

IPMC SECTION 106
VIOLATIONS

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

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

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

1. Any person failing to comply with ~~a notice of violation or order served in accordance with Section 107~~ this code, including the orders and directions of the code official, shall be deemed guilty of a misdemeanor or civil infraction as determined by the local municipality, and the violation shall be deemed a *strict liability offense*.
2. If the notice of violation is not complied with, the *code official* shall be permitted to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful *occupancy* of the structure in violation of the provisions of this code or of the order or direction made pursuant thereto.
3. Any civil action taken by the authority having jurisdiction ~~on such~~ to enforce this code on a *premises* shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate and in addition, constitute the personal liability jointly and severally of those responsible.

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

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

IPMC SECTION 107
NOTICES AND ORDERS

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

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

1. Delivered personally;
2. Sent by certified or first-class mail addressed to the last known address; or

3. If the notice is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice.

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

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

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

IPMC SECTION 108
UNSAFE STRUCTURES AND EQUIPMENT

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

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

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

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

1. Any door, aisle, passageway, stairway, exit or other means of egress that does not conform to the *approved* building or fire code of the jurisdiction as related to the requirements for existing buildings.
2. The walking surface of any aisle, passageway, stairway, exit or other means of egress is so warped, worn loose, torn or otherwise unsafe as to not provide safe and adequate means of egress.
3. Any portion of a building, structure or appurtenance that has been damaged by fire, earthquake, wind, flood, *deterioration*, *neglect*, abandonment, vandalism or by any other cause to such an extent that it is likely to partially or completely collapse, or to become *detached* or dislodged.
4. Any portion of a building, or any member, appurtenance or ornamentation on the exterior thereof that is not of sufficient strength or stability, or is not so *anchored*, attached or fastened in place so as to be capable of resisting natural or artificial loads of one and one-half the original designed value.
5. The building or structure, or part of the building or structure, because of dilapidation, *deterioration*, decay, faulty construction, the removal or movement of some portion of the ground necessary for the support, or for any other reason, is likely to partially or completely collapse, or some portion of the foundation or underpinning of the building or structure is likely to fail or give way.
6. The building or structure, or any portion thereof, is clearly unsafe for its use and *occupancy*.

7. The building or structure is *neglected*, damaged, dilapidated, unsecured or abandoned ~~so as to become an attractive nuisance to~~ and not sufficiently secure to prevent children ~~who might play in~~ from entering the building or structure to their danger, becomes a harbor for vagrants, the homeless or criminals ~~or immoral persons~~, or ~~enables~~ not sufficiently secure to prevent persons from entering ~~to resort to~~ the building or structure ~~for~~ and committing a nuisance or an unlawful act.
8. Any building or structure has been constructed, exists or is maintained in violation of any specific requirement or prohibition applicable to such building or structure provided by the *approved* building or fire code of the jurisdiction, or of any law or ordinance to such an extent as to present either a substantial risk of fire, building collapse or any other threat to life and safety.
9. A building or structure, used or intended to be used for dwelling purposes, because of inadequate maintenance, dilapidation, decay, damage, faulty construction or arrangement, inadequate light, *ventilation*, mechanical or plumbing system, or otherwise, is determined by the *code official* to be unsanitary, unfit for human habitation or in such a condition that is likely to cause sickness or disease.
10. Any building or structure, because of a lack of sufficient or proper fire-resistance-rated construction, fire protection systems, electrical system, fuel connections, mechanical system, plumbing system or other cause, is determined by the *code official* to be a threat to life or health.
11. Any portion of a building remains on a site after the demolition or destruction of the building or structure or whenever any building or structure is abandoned so as to ~~constitute such building or portion thereof as an attractive nuisance~~ ~~or~~ become a hazard to the public or a nuisance.

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

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

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

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

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

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

IPMC SECTION 109
EMERGENCY MEASURES

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

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

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

IPMC SECTION 110
DEMOLITION

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

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

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

IPMC SECTION 111
MEANS OF APPEAL

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

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

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

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

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

IPMC SECTION 112
STOP WORK ORDER

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

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

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

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

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

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

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

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

Cost Impact:

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

Committee Action Hearing Results

PART I - IADMIN
Committee Action: Approved as Submitted

Committee Reason: The clean-up suggested for the IPMC will help deal with the legal scrutiny that this document typically goes through during the enforcement process. This will be of benefit to jurisdictions when they need to go to court over property maintenance issues. There were concerns expressed by some of the committee members that the definition for 'owner' needed some additional revisions. For the definition, clarification is needed on what might constitute 'interest' in a building and what is a building 'operator'.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler representing City of Seattle Department of Planning & Development, requests Disapproval.

Commenter's Reason: While we appreciate IMLA's attempt at revamping the code provisions related to enforcement, we find too many flaws to approve the proposal. Some of our objections are minor, but others are very significant. The flaws defeat the purpose of the proposal--to avoid litigation—by creating many questions of interpretation and application of the codes.

Section 106.3 Options for prosecution of violations, is among our most serious objections to this proposal. It makes it a crime to fail to comply with the code. Since the section also makes it a strict liability offense, the person will be guilty even if they don't know there is an applicable code provision, or that their building doesn't comply. F162-13, approved by the Fire Code Committee, adds a new section to the IPMC requiring that smoke alarms in residences be replaced within 10 years of the date of manufacture of the alarms; failure to do so would be a crime according to this proposal.

202 Definition of "owner". By listing those "having possession or control of the property" and "operators" as owners, the scope of the term is expanded too far. Squatters would be considered owners; the building manager or maintenance crew could be considered owners. "Operator" may be appropriate for the IPMC definition, but unnecessarily complicates enforcement of the IBC and IFC. The more suitable way to use the term "operators" is to insert it in code sections that are appropriate to apply to operators. IPMC Section 102.2 is an example.

102.2 Maintenance, requires approval of the code official before services, equipment or utilities can be interrupted while alteration work is going on. This is overly burdensome for code officials—particularly because the interruptions can be very short. Activities such as shutting off water while replacing a sink or parts of a landscape sprinkler system would require approval by the code official.

103.2 Appointment, authorizes the code official to enforce the code "without further local government action." This language is confusing and unnecessary. Enforcement of the current IPMC does not require further government action.

105.6 Research reports, in the existing code, requires that data supporting approval of materials be "valid research reports from *approved* sources." By changing the section to say that this supported data is permitted to be valid reports from approved sources, the proposal makes this code section useless, since nothing is required. It seems obvious that valid reports from approved sources would be acceptable, especially since the code official determines what is "approved." If the requirement for reports is believed to be too onerous, it should be removed from the code.

107.4 Unauthorized tampering, has an error in syntax. "Signs … shall not be mutilated, destroyed or tampered with, or removed without authorization from the *code official* is unlawful and constitutes a violation of this code." Words are missing between "code official" and "is unlawful."

108.4 Placarding. "In addition to the procedures authorized in Section 108.2, when the code official has issued an unsafe abatement order …" This sentence says that the abatement order is unsafe.

109.1 Imminent danger. "It shall be unlawful for any person to enter such structure except as directed by the Code Official for the purpose of securing the structure, making the required repairs, removing the hazardous condition or of demolishing the same." (emphasis added.) The code official should not be "directing" anyone to go into unsafe structures, nor should they be responsible for "allowing" someone in. These decisions should be left to the owner—it becomes a contractual issue between the owner and the contractor hired by the owner. As written, this appears to make the code official responsible and liable if there is a problem (e.g., collapse) while workers are in the building. Also note that this section would not allow an engineer or other design professional into the building to evaluate it and make repair recommendations. It's especially troublesome to require code official approval after a natural disaster when code officials are likely to be fully occupied with other important work.

109.3 Closing streets. The code official should have clear authority to close sidewalks and streets if there is an imminent threat of a building's collapse such as might occur after a natural disaster. The code official should certainly coordinate with the public works department, but shouldn't need to wait for authority if there is an imminent hazard. The changes make it unclear whether the code official is required to be directed by the agency having jurisdiction. Another question is whether "agency having jurisdiction is different that "authority having jurisdiction." Both terms are used. Note also that many code officials don't work "at the direction" of the public works director.

109.5 Costs of emergency repairs. This section has errors in syntax that make it difficult to interpret. **"**Costs … shall be the personal responsibility of the owner and responsible parties of the premises and constitute jointly and severally removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate." (emphasis added) Circular language adds to the unclarity about who is required to pay for costs—costs are the responsibility of the responsible parties.

ADM5-13, Part I
Final Action: AS AM AMPC____ D

NOTE: PART II IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM5-13, Part II
PART II – IRC: 202

Proposed Change as Submitted

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

Proponent: Karen Blake, representing International Municipal Lawyers Association

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

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

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

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

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

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

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

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

Cost Impact:

Committee Action Hearing Results

PART II – IRC
HEARD BY IRC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that the proposed changes are unnecessary.

Assembly Action: **None**

ADM6-13, Part I

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

Proposed Change as Submitted

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

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

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

Revise the International Building Code as follows:

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

Revise the International Code Council Performance Code as follows:

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

Revise the International Fire Code as follows:

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

Revise the International Fuel Gas Code as follows:

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

Revise the International Mechanical Code as follows:

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

Revise the International Plumbing Code as follows:

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

Revise the International Private Sewage Disposal Code as follows:

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

Revise the International Property Maintenance Code as follows:

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

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

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

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

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

101.3-ADM (IBC)-BALDASSARRA

Committee Action Hearing Results

PART I - IADMIN
Committee Action: Disapproved

Committee Reason: The committee agreed that the scope should be coordinated across the codes, however, they preferred the "reasonable level of life safety" language found in the IFC. The term 'safeguard' is not a match to "provide safety to."

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl F. Baldassarra, P.E., representing Rolf Jensen & Associates, Inc., requests Approval as Modified by this Public Comment.

Replace the proposal with the following:

Revise the International Building Code as follows:

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

Revise the International Code Council Performance Code as follows:

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

Revise the International Fire Code as follows:

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

Revise the International Fuel Gas Code as follows:

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

Revise the International Mechanical Code as follows:

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

Revise the International Plumbing Code as follows:

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

Revise the International Private Sewage Disposal Code as follows:

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

Revise the International Property Maintenance Code as follows:

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

Commenter's Reason: The intent of this change is to make minor, but important, clarifications of the intent of the various ICC codes. It is important that these sections reflect both the intention of the code community and the relative level of safety that is reasonably provided through these regulations in a consistent manner. There is no intention to reduce the level of safety provided by the code with this change. All users and beneficiaries of the code will be better served through this clarification.

This modification addresses the reasons for disapproval of both Part I and Part II at the Code Development Hearing in Dallas.

Specifically, the reason for Disapproval of Part I by the Administrative Provisions Committee was published as follows:

The committee agreed that the scope should be coordinated across the codes, however, they preferred the "reasonable level of life safety" language found in the IFC. The term 'safeguard' is not a match to "provide safety to."

Also, the reason for Disapproval of Part II by the International Residential Committee was published as follows:

The committee disapproved this code change proposal because they felt that the term "safeguards" (sic) *is too vague, as the proponent notes. If the proposed requirements were used relative to emergency responders, they need to be further explained or narrowed.*

As can be seen by the reviewing the revised proposals, the Committees' comments have been addressed and, therefore, the Proponent requests that the proposals for each code be Approved as Modified by this public comment.

ADM6-13, Part I

Final Action: AS AM AMPC____ D

ADM6-13, Part II
PART II – IRC R101.3

Proposed Change as Submitted

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

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

PART II – IRC

Revise the International Residential Code as follows:

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

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

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

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

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

101.3-ADM (IBC)-BALDASSARRA

Committee Action Hearing Results

PART II – IRC
HEARD BY IRC COMMITTEE
Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the term 'safeguards is too vague, as the proponent notes. If the proposed requirements were used relative to emergency responders, they need to be further explained or narrowed.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl F. Baldassarra, P.E., representing Rolf Jensen & Associates, Inc., requests Approval as Modified by this Public Comment.

Replace the proposal with the following:

Revise the International Residential Code as follows:

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

Commenter's Reason: The intent of this change is to make minor, but important, clarifications of the intent of the various ICC codes. It is important that these sections reflect both the intention of the code community and the relative level of safety that is reasonably provided through these regulations in a consistent manner. There is no intention to reduce the level of safety provided by the code with this change. All users and beneficiaries of the code will be better served through this clarification.

This modification addresses the reasons for disapproval of both Part I and Part II at the Code Development Hearing in Dallas. Specifically, the reason for Disapproval of Part I by the Administrative Provisions Committee was published as follows:

The committee agreed that the scope should be coordinated across the codes, however, they preferred the "reasonable level of life safety" language found in the IFC. The term 'safeguard' is not a match to "provide safety to."

Also, the reason for Disapproval of Part II by the International Residential Committee was published as follows:

The committee disapproved this code change proposal because they felt that the term "safeguards" (sic) *is too vague, as the proponent notes. If the proposed requirements were used relative to emergency responders, they need to be further explained or narrowed.*

As can be seen by the reviewing the revised proposals, the Committees' comments have been addressed and, therefore, the Proponent requests that the proposals for each code be Approved as Modified by this public comment.

ADM6-13, Part II

Final Action: AS AM AMPC____ D

ADM11-13
IBC: [A] 101.4.7 (New), 202 (New), Chapter 35

Proposed Change as Submitted

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

Add new text to the International Building Code as follows:

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

Add new text to the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

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

Add standard to IBC Chapter 35 as follows:

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

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

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

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

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

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The language implies that if you use a performance based approach for a piece of the building, then you have to use a performance based approach for the entire building. Having the ICCPC as an option is appropriate; however, it should not be a requirement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

J. William Degnan, President, representing National Association of State Fire Marshals, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

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

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This modification addresses the committee's concern that the original proposal would only address complete performance based design and not allow partial use of the ICCPC in various construction scenarios.

ADM11-13

Final Action: AS AM AMPC____ D

ADM12-13
IBC: [A] 101.4.7 (New), 202 (New)

Proposed Change as Submitted

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

Add new text to the International Building Code as follows:

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

Add new text to the International Building Code as follows:

IBC SECTION 202
GENERAL DEFINITIONS

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

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

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

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

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

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Further revise the proposal as follows:

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

Committee Reason: The modification to strike the word 'all' would allow the jurisdiction to address fire risk as part of the designation of the wildland-urban interface area. The IWUIC is currently referenced in the body of the IBC, therefore, it is appropriate for it to be included in the scoping chapter.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler representing City of Seattle Dept of Planning & Development, requests Disapproval.

Commenter's Reason: The IWUIC was developed for a special purpose. It was meant to be available for jurisdictions where there is danger of wildfire. Some jurisdictions may benefit from having the IWUIC be part of the IFC, but those jurisdictions already have the option to adopt the IWUIC separately, just as they would any other code. The IWUIC should not be mandatory for those jurisdictions that do not have *wildland-urban interface areas* or where interface areas are so negligible that it may be considered a nuisance to enforce the provisions contained in the IWUIC. Many jurisdictions have no history of wildfire, and do not have conditions where wildfire is likely to occur in the future.

According to the definition, the only requirements for an area to be considered a "wildland urban interface area" are that there be human development and adjacency to "vegetative fuel". There is no requirement that there be a risk of wildfire. The definition does apply to Central Park in New York, and to temperate rain forest areas such as occur in California, Oregon, Washington and Alaska which can receive 144 inches or more of rain per year.

Mandating adoption of WUIC, means those jurisdiction without risk of wildfire will be required to designate areas as not being wildland urban interface areas even though they meet the definition.

The committee's reason for disapproval was that the IBC references the IWUIC. However, there is only one reference in the IBC, in Table 1505.1 and that reference does not require universal adoption of the IWUIC. Footnote a to the table states that the table applies "Unless otherwise required in accordance with the *International Wildland-Urban Interface Code* or due to the location of the building within a fire district in accordance with Appendix D". The footnote means that the table applies unless the jurisdiction has adopted the IWUIC. It doesn't assume that the IWUIC is adopted.

ADM12-13
Final Action: AS AM AMPC____ D

ADM14-13
IFC: [A] 102.3, [A] 102.3.1 (New), [A] 102.3.2 (New)

Proposed Change as Submitted

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

Revise the International Fire Code as follows:

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

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

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

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

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

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

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

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

102.3.1 (NEW)-ADM (IFC)-SAMPSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The change in use from a home to another occupancy is already addressed in the IEBC. This proposed language for the IFC would include homes that were originally constructed under the IRC, which does not address mixed use buildings. Requiring this IRC home to fully comply with the IFC could result in conflicts.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

J. William Degnan, President, representing National Association of State Fire Marshals, requests Approval as Submitted.

Commenter's Reason: This proposal does make sense and the proposal does provide identical language to the IFC and it does provide guidance on how to deal with occupancy changes from an IRC to IBC or IEBC construction.

ADM14-13
Final Action: AS AM AMPC____ D

ADM16-13
IFC: [A] 102.5

Proposed Change as Submitted

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

Revise the International Fire Code as follows:

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

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

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

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

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

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

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

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

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed deletion is not consistent with the full intent of the code; the sentence should be refined to include regulated items. This would create a jurisdiction overlay and possible conflicts with items addressed in the IRC and IFC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Orlowski representing National Association Of Home Builders, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

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

1. Construction and design provisions: Provisions of this code pertaining to the exterior of the structure shall apply including, but not limited to, premises identification, fire apparatus access and water supplies.
2. Administrative, ~~and~~ operational and maintenance provisions: ~~All such~~ Where the *International Residential Code* references the *International Fire Code*, the provisions of this code shall apply.

Commenter's Reason: During the code development hearing, the committee agreed that there was a need for refining the current language to eliminate the duplication of overlap between permits issued under the IRC and the IFC. The committee was concerned with the elimination of the term maintenance and stated that there would be a conflict between the codes where there are provisions within the IRC that specifically reference the IFC. We feel that this public comment addresses the concerns that were raised by both the committee and those that spoke against the original proposal.

Public Comment 2:

Robert J Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

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

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

Commenter's Reason: The modified language addresses both the concern of the original proponent, i.e., a potential conflict with the scoping of the IRC, and that of objectors and the committee.

There are items where the IRC has a specific reference to the IFC for compliance during construction activities. The modified language clarifies that only when the IRC points to the IFC will the IFC construction permit processes apply for the installation of interior or exterior systems or devices.

It leaves the second item unchanged as there are regulated activities that occur in IRC constructed buildings including, but not limited to I Group uses.

ADM16-13

Final Action: AS AM AMPC____ D

ADM18-13, Part I

PART I - IBC: [A] 103.2; IEBC: [A] 103.2; IFC: [A] 103.2; IFGC: [A] 103.2; IMC: [A] 103.2; IPC: [A] 103.2; IPMC: [A] 103.2; IPSDC: [A] 103.2; IWUIC: [A] 103.2

NOTE: *PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART II IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART III.*

Proposed Change as Submitted

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

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

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

Revise the International Building Code as follows:

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

Revise the International Existing Building Code as follows:

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

Revise the International Fire Code as follows:

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

Revise the International Fuel Gas Code as follows:

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

Revise the International Mechanical Code as follows:

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

Revise the International Plumbing Code as follows:

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

Revise the International Private Sewage Disposal Code as follows:

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

Revise the International Property Maintenance Code as follows:

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

Revise the International Wildland-Urban Interface Code as follows:

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

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

Cost Impact: No cost

R103.2-RB-PETERSON

Committee Action Hearing Results

PART I - IADMIN
Committee Action: **Disapproved**

Committee Reason: The current language is consistent with jurisdiction ordinances. Removal of the phrase "the chief appointing authority of" would cause confusion as to who is the jurisdiction.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas Peterson, Box Elder County, representing self, requests Approval as Submitted.

Commenter's Reason: This code change was approved by the Residential Committee; it was disapproved by the Admin committee on the premise that if we remove the phrase "the chief appointing authority of" would cause confusion as to who is the jurisdiction. The Jurisdiction is clearly defined in the code and would not cause confusion in that regard. The ISPSC committee disapproved this code change with the following reason; "A jurisdiction is an area. An area cannot appoint a code official. The current text is proper." While I agree with their definition of a "jurisdiction" I also understand that every jurisdiction has elected officials that set policy for that specific jurisdiction. It is those elected officials responsibility to determine who and how one is hired in that jurisdiction, not ICC's.

ADM18-13, Part I
Final Action: AS AM AMPC____ D

ADM18-13, Part III
PART III - ISPSC 103.2.

NOTE: *PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART II IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART III.*

Proposed Change as Submitted

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

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

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

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

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

Cost Impact: No cost

R103.2-RB-PETERSON

Committee Action Hearing Results

PART III – ISPSC
HEARD BY THE ISPSC COMMITTEE
Committee Action: **Disapproved**

Committee Reason: A jurisdiction is an area. An area cannot appoint a code official. The current text is proper.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas Peterson, Box Elder County, representing self, requests Approval as Submitted.

Commenter's Reason: This code change was approved by the Residential Committee; it was disapproved by the Admin committee on the premise that if we remove the phrase "the chief appointing authority of" would cause confusion as to who is the jurisdiction. The Jurisdiction is clearly defined in the code and would not cause confusion in that regard. The ISPSC committee disapproved this code change with the following reason; "A jurisdiction is an area. An area cannot appoint a code official. The current text is proper."

While I agree with their definition of a “jurisdiction” I also understand that every jurisdiction has elected officials that set policy for that specific jurisdiction. It is those elected officials responsibility to determine who and how one is hired in that jurisdiction, not ICC’s.

ADM18-13, Part III

Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM18-13, Part II
PART II - IRC: R103.2

Proposed Change as Submitted

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

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

PART II – IRC

Revise the International Residential Code as follows:

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

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

Cost Impact: No cost

R103.2-RB-PETERSON

Public Hearing Results

PART II – IRC
HEARD BY IRC COMMITTEE
Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that who specifically makes the appointment should be left up to the jurisdiction.

Assembly Action: **None**

ADM30-13, Part II
PART II - IECC: C103.4

NOTE: *PARTS I & III DID NOT RECEIVE A PUBLIC COMMENT AND ARE ON THE CONSENT AGENDA. PARTS I AND III ARE REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.*

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERICAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

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

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C103.4 Amended construction documents. <u>Work shall be installed in accordance with the approved construction documents, and any</u> changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

Reason: The proposed language is from 107.4 in the IBC which better describes the intent of the section. This proposal correlates the IFC requirement with the IBC so users, contractors and designers are subject to the same code provision in both codes. There is no justification for differing language in the IFC as opposed to the IBC on this topic. The current language in IFC 105.4.5, to submit corrected documents, is too specific based on the <u>sole</u> fact of "when field conditions necessitate. . ." Clearly, this not the only reason that revised construction documents would be needed. As an example, the owner may choose to make a revision, a design professional may value engineer a design or a contractor may change materials from the original approved construction documents. All of these items are reasons that necessitate an amended construction document submittal under the IBC but currently do not under the IFC. This proposal will match the IBC and IFC language is broad enough to addresses any condition that may cause the installation to not be in compliance with the approved construction documents.

Cost Impact: This proposal will not increase the cost of construction. The IBC already requires amended construction documents per this language.

Staff analysis: The proposed language is found in IBC Section 107.4, IEBC Section 106.4 and IRC Section R106.4.

105.4.5-ADM (IFC)-APFELBECK

Committee Action Hearing Results

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The proposal doesn't bring clarity to the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Donald Vigneau, representing Northeast Energy Efficiency Partnerships Inc., requests Approval as Submitted.

Commenter's Reason: The approvals of ADM 30-13 Parts I & III for IBC, IWUIC and IRC will not be consistent with IECC CE unless this vote is overturned. There is no legitimate reason the provisions in the other codes should not coordinate in the energy code.

ADM30-13, Part II
Final Action: AS AM AMPC____ D

NOTE: PARTS I & III REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM30 – 13
PART I - IFC: [A] 105.4.5; IWUIC: [A] 108.10;
PART III - IECC: R103.4

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERICAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

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

PART I –IFC; IWUIC

Revise the International Fire Code as follows:

IFC [A] 105.4.5 ~~Corrected documents~~ Amended construction documents. ~~Where field conditions necessitate any substantial change from the approved construction documents, the fire code official shall have the authority to require the corrected construction documents to be submitted for approval.~~ Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 108.10 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the *approved* documents shall be resubmitted for approval as an amended set of construction documents.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

Reason: The proposed language is from 107.4 in the IBC which better describes the intent of the section. This proposal correlates the IFC requirement with the IBC so users, contractors and designers are subject to the same code provision in both codes. There is no justification for differing language in the IFC as opposed to the IBC on this topic. The current language in IFC 105.4.5, to submit corrected documents, is too specific based on the sole fact of "when field conditions necessitate. . ." Clearly, this not the only reason that revised construction documents would be needed. As an example, the owner may choose to make a revision, a design professional may value engineer a design or a contractor may change materials from the original approved construction documents. All of these items are reasons that necessitate an amended construction document submittal under the IBC but currently do not under the IFC. This proposal will match the IBC and IFC language is broad enough to addresses any condition that may cause the installation to not be in compliance with the approved construction documents.

Cost Impact: This proposal will not increase the cost of construction. The IBC already requires amended construction documents per this language.

Staff analysis: The proposed language is found in IBC Section 107.4, IEBC Section 106.4 and IRC Section R106.4.

PART I - IADMIN
Committee Action: **Approved as Submitted**

Committee Reason: The proposed language will coordinate the IBC, IFC and IWUIC. The added language will improve consistency in document preparation. There was a suggestion that perhaps the amended construction documents should be for "substantial" rather than "any" changes. This might be interpreted to require revised drawings for minor corrections dealing with construction issues.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: This proposed language better states the intent of this section.

Assembly Action: **None**

ADM34-13
IFC [A] 105.7.12 (New)

Proposed Change as Submitted

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

Proponent: Ian Hardage, San Ramon Valley Fire Protection District (ihardage@srvfire.ca.gov) and Amber Anderson, Cosumnes CSD Fire Department (AmberAnderson@csdfire.com**)**, representing California Fire Chiefs Association

Revise the International Fire Code as follows:

IFC [A] 105.7.12 Mechanical refrigeration. A construction permit is required for the installation of or modification to a mechanical refrigeration unit or system.

(Renumber subsequent sections)

Reason: Currently only an operational permit is required to operate a mechanical refrigeration unit or system regulated by Chapter 6. In order for these systems to be maintained and operated in compliance with Chapter 6, these units or systems must be compliant with Chapter 6 at time of installation. Not all requirements of IFC Chapter 6 are found in the IMC, ASHRAE 15, or IIAR 2. Specifically, IFC, Sections 606.5, 606.10.1.2, and 606.12.3 which provide fire code officials the opportunity to provide mechanical refrigeration system installation design criteria and or exceptions.

It is not uncommon for mechanical refrigeration systems to be installed, replaced or modified without fire department knowledge or input until they are found on an emergency call or during a facility inspection. Other systems sensitive to change such as stationary battery systems, compressed gases, hazardous materials, and flammable and combustible liquids require a construction permit as found in IFC Section 105.7. The same opportunity is needed for mechanical refrigeration systems.

Increases in construction costs would only occur if an authority having jurisdiction chose to implement a separate fee for permit. All other costs such as design drawings and construction of the system should already be included in the original design budget. We feel that any cost increase by an AHJ would likely be significantly less than any delays in construction or operation of the system when such system is determined to be non-compliant with codes and standards enforced by the fire code official at a time less than ideal for the customer such as at final inspection.

Cost Impact: The code proposal will increase the cost of construction.

105.7.12 (NEW)-ADM (IFC)-ANDERSON-HARDAGE

Committee Action Hearing Results

Committee Action: **Approved as Modified**
HEARD BY THE IFC COMMITTEE

Further modify the proposal as follows:

IFC [A] 105.7.12 Mechanical refrigeration. A construction permit is required for the installation of or modification to a mechanical refrigeration unit or system regulated by Chapter 6.

Committee Reason: The committee agreed that, in addition to the operational permit required by Section 105.6.38, a construction permit is needed to provide the fire code official with the ability to review plans and specifications for new or modified refrigeration systems. The modification will limit the requirement to built-in refrigeration systems addressed in Chapter 6, not all refrigeration systems or equipment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing International Institute of Ammonia Refrigeration, requests Disapproval.

Commenter's Reason: The requirement to obtain a fire code construction permit for installation of refrigeration systems creates unnecessary overlap between the IFC and IMC. Many of the IFC Code Development Committee members recognized this. The Committee's initial motion for this item was Disapproval, and that motion narrowly lost by a vote of 6:8.

Every refrigeration system covered in IFC Chapter 6 already requires an IMC construction permit, which covers the entire system installation. In contrast, the IFC contains only a few construction related requirements for refrigeration systems, and nearly all of these are duplicated in or referenced by the IMC, ASHRAE 15 and/or IIAR 2. It is true that some fire departments, but certainly not all, have varying levels of interest in mechanical refrigeration systems. However, fire department participation in the construction process for these systems has long been accomplished through a cooperative relationship between fire and mechanical code officials under the existing mechanical code permit requirement.

The solution for cases where there is a lack of coordination between fire and mechanical code officials, perhaps because they aren't getting along, should not be adding another layer of bureaucracy via an additional permit requirement. If anything, competing permits and approval authority may make a bad situation worse, putting the designer and the owner in the middle of a conflict between code enforcement agencies.

It also makes no sense to single out refrigeration systems for a fire code construction permit when there are many other mechanical systems, such as fuel fired appliances, hazardous product exhaust systems and cooking hoods, that are covered in the IFC but defer to the IMC for construction permits.

Finally, the original justification statement for this proposal stated *"It is not uncommon for mechanical refrigeration systems to be installed, replaced or modified without fire department knowledge or input until they are found on an emergency call or during a facility inspection."* If the fire code official is enforcing the current operational permit requirement for these systems, that shouldn't happen.

ADM34-13

Final Action: AS AM AMPC____ D

ADM37-13
IEBC: 106.2.6 (New), Chapter 16

Proposed Change as Submitted

THIS CHANGE WILL BE HEARD BY THE EXISTING BUILDING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMMITTEE.

Proponent: Rebecca Morley, representing National Center for Healthy Housing

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

IEBC 106.2.6 Certifications and plans where painted surfaces are disturbed. Where a Group E, I-4, R-2, R-3 or R-4 occupancy was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official one of the following:

1. Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance for renovations in accordance with 40 CFR 745 requirements for renovations.
2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.

Add the following standard to IEBC Chapter 16:

EPA U.S. Environmental Protection Agency

40 CFR 745 Lead-Based Paint Poisoning Prevention in Certain Residential Structures – July 1, 2012

Reason: Section 106 covers construction documents, and the specific provisions include fire protection drawings, means of egress, exterior wall envelope and site plans. This code change proposal, 106.2.6, adds a simple requirement that permit applicants include, with the other construction documents, evidence of compliance with health-protective requirements to protect children from lead poisoning during additions, alterations, and repairs to pre-1978 homes.

The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code through the requirement for construction documents. Once the Code requires permit applicants to demonstrate up front their knowledge of, and plans to follow, the federal and state renovation rule requirements, the code official will be positioned to provide important oversight and leadership in preventing lead poisoning without even leaving the office. This oversight will help level the playing field between contractors who are complying with the rule and noncompliant entities who are under-pricing and undercutting their competitors. By merely asking an applicant for the missing documents, the code official can influence entities not following the law into compliance before the work even starts. In a few cases, these entities may be unaware of the regulations. Although these regulations have been in effect since April 2010, and have been adopted by 12 states, reported non-compliance is affecting the compliant contractor and continuing the problem of lead poisoning in the US.

The proposed “plan that indicates compliance with the federal disclosure and work practice requirements” can take different forms depending on what documents the builder is already using. Some builders who work on pre-1978 homes are already using a form to track their upfront assessments and another form for recordkeeping. Anyone working in pre-1978 homes should have an EPA or state certification for their firm, along with at least one individual renovator certification that the renovator received at the end of the required one-day training course. dispersal of lead before, during, and after work performed on a pre-1978 home. These requirements are already in effect in federal and state regulation.

The plan and certifications would only be needed for a structure likely to contain lead-based paint: a pre-1978 home. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead’s presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

Renovation of painted surfaces is a significant source of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.[1,2,5,8,9] Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood (μg/dL) is greatest at lead levels below 10 μg/dL. As a child’s BLL increases from 1 to 10 μg/dL, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 μg/dL the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.[10]

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an "extremely low" IQ by 57%, substantially increasing the cost of special education programs.[3] Considering the costs to the special education system alone, one study conservatively estimated that it costs $38,000 over three years to educate a child with lead poisoning.[11] Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes. EBLLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.[1,4] Each 1 μg/dL reduction in the average preschool blood lead level saves $13.4 billion from the direct and indirect costs of crime.[1]

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,[12] the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 μg/dL. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 μg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 μg/dL.[6]

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk – and level the playing field among contractors working on pre-1978 properties.

The EPA 40 CFR 745 standard is available at http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml.

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2. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations. Environ. Health Perspect. 2008;116(2):243–248.
3. Mazumdar M, Bellinger DC, Gregas M, Abanilla K, Bacic J, Needleman HL. Low-level environmental lead exposure in childhood and adult intellectual function: a follow-up study. Environ Health. 2011;10:24.
4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. Arch. Dis. Child. 2009;94(11):844–848.
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6. Miranda ML, Maxson P, Kim D. Early childhood lead exposure and exceptionality designations for students. Int J Child Health Hum Dev. 2010;3(1):77–84.
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8. Lanphear BP, Hornung R, Khoury J, et al. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. Environ. Health Perspect. 2005;113(7):894–899.
9. Canfield RL, Henderson CRJ, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. N. Engl. J. Med. 2003;348(16):1517–1526.16.
10. Lanphear BP, Dietrich K, Auinger P, Cox C. Cognitive deficits associated with blood lead concentrations. Public Health Rep. 2000;115(6):521–529.17.
11. Korfmacher KS. Long-term costs of lead poisoning: How much can New York save by stopping lead? Rochester, NY: University of Rochester; 2003.
12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. N Engl J Med. 1982; 306(6):367.

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

Staff analysis: A review of the standard proposed for inclusion in the code, NFPA 914 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

106.2.6 (NEW)-ADM (IEBC)-MORLEY

Committee Action Hearing Results

Committee Action: Disapproved
HEARD BY THE IEBC COMMITTEE

Committee Reason: The proposal was disapproved for several reasons. First, the committee felt that technical requirements should not be located in Chapter 1. Secondly, there was discomfort with having to enforce federal regulations as a local building official. This would expand the building official's role inappropriately. Finally, there was concern with what would be expected in terms of accepting and approving a plan as required by this proposal. There was also concern with the accuracy of the lead tests available.

For staff analysis of the content of EPA 40 CFR 745-July 1, 2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mark Henshall, representing US Environmental Protection Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IEBC 106.2.6 Certifications ~~and plans~~ where painted surfaces are disturbed. Where a Group ~~E, I-4,~~ R-2, R-3 or R-4 occupancies was completed prior to 1978 and repair, alteration or additions being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official ~~one of the following:~~

~~1.~~ a copy of a current Renovation Repair and Painting firm certification issued by either EPA per 40 CFR 745.89 or by a state program authorized by EPA per 40 CFR 745 Subpart Q. ~~Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance for renovations in accordance with 40 CFR 745 requirements for renovations.~~

~~2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.~~

Add the following standard to IEBC Chapter 16:

EPA U.S. Environmental Protection Agency

40 CFR 745 Lead-Based Paint Poisoning Prevention in Certain Residential Structures – July 1, 2012

Commenter's Reason: Section 106 covers construction documents, and the specific provisions include fire protection drawings, means of egress, exterior wall envelope and site plans. This code change proposal adds a requirement that permit applicants include, with the other construction documents, evidence of compliance with the firm certification requirements of EPA's or an authorized states Renovation, Repair and Painting Regulation program. The local building code official would have no other responsibility than to request a copy of a current Renovation Repair and Painting firm certification.

EPA's 2008 Lead-Based Paint Renovation, Repair and Painting (RRP) Rule aims to protect the public from lead-based paint hazards associated with renovation, repair and painting activities. These activities can create hazardous lead dust when surfaces with lead paint, are disturbed. The rule requires workers to be certified and trained in the use of lead-safe work practices, and requires renovation, repair and painting firms to be EPA-certified. This training and adherence to lead-safe work practices will help ensure residents are not exposed to hazardous levels of lead contaminated dust.

The original proposal required "a plan for compliance for renovations in accordance with 40 CFR 745 requirements for renovations." Questions were raised as to what constituted a plan and what would be expected in terms of the code official approving such a plan. In addition, the original proposal could be interpreted to mean that local building officials were being asked to enforce a federal regulation. This modification to the original proposal has addressed these concerns. Because this proposal is not a technical requirement, it is appropriate to include in Chapter 1.

ADM37-13

Final Action: AS AM AMPC____ D

ADM38-13
IFC: 106.3 (New), 113.2

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Add new text to the International Fire Code as follows:

IFC [A] 106.3 Periodic building fire safety inspections. In addition to any other inspections required or authorized by this code, all buildings shall be subjected to periodic building fire safety inspections in compliance with the requirements of Sections 106.3.1 through 106.3.6.

Exceptions: Periodic building fire safety inspections shall not be required in any of the following:

1. Buildings classified as Group U occupancies that are associated with Group R-3 occupancies.
2. Dwelling units in Group R-2 and Group R-3 occupancies.
3. Dwelling units constructed in accordance with the *International Residential Code.*

IFC [A] 106.3.1 Scope. The scope of periodic building fire safety inspections shall include the maintenance of safeguards as required by Section 107.1; the maintenance of the means of egress, fire-resistance-rated construction, and fire protection systems; storage arrangements, including hazardous material and combustible material storage; evidence of unlawful alterations; compliance with the fire safety and evacuation plan requirements of Chapter 4; recordkeeping, housekeeping and such other requirements as determined by the *fire code official*.

IFC [A] 106.3.2 Inspecting entity. Periodic building fire safety inspections required by Section 106.3 shall be conducted by the *fire code official*.

Exception: Where the *fire code official* determines that periodic fire safety inspections shall be conducted by an *approved* third party.

IFC [A] 106.3.3 Inspector qualifications. *Fire code officials* and *approved* third parties conducting periodic building fire safety inspections required by Section 106.3 shall, at a minimum, be certified through a recognized fire inspector certification program.

Exception: Where the building is subject to a building fire safety inspection program approved by the *fire code official*.

IFC [A] 106.3.4 Frequency of inspection. The minimum required frequency of periodic building fire safety inspections shall be determined by the *fire code official* based upon the *fire code official's* assessment of the risk or once every 5 years.

IFC [A] 106.3.5 Filings. Inspection reports for periodic building fire safety inspections conducted by an *approved* third party in accordance with Section 106.3.2 shall be submitted to the *fire code official* in accordance with the frequency of inspection schedule established by the *fire code official* in accordance with Section 106.3.4. The *fire code official* has the authority to prescribe the form and format of such report.

IFC [A] 106.3.6 Not a limitation on inspection authority. Periodic building fire safety inspections required by Section 106.3 shall not be construed to limit the *fire code official's* inspection authority pursuant to other sections of this code.

(Renumber subsequent sections)

Revise the International Fire Code as follows:

IFC [A] SECTION 113
FEES

IFC [A] 113.2 Schedule of ~~permit~~ fees. A fee for each permit, and fees associated with establishing a program to implement the requirement for periodic building fire safety inspections in accordance with Section 106.3, shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "NIST Charleston Sofa Store Fire Recommendations". The scope of the activity is noted as:

Review the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 2 of the NIST report reads as follows:

"Model Building and Fire Code Enforcement: NIST recommends that all state and local jurisdictions implement aggressive and effective fire inspection and enforcement programs that address:
a) all aspects of the building and fire codes;
b) adequate documentation of building permits and alterations;
c) means of fire protection systems inspection and detailed recordkeeping;
d) frequency and rigor of fire inspections, including follow-up and auditing procedures; and
e) guidelines for remedial requirements when inspections identify deviations from code provisions."

Following a review of recommendation 2 of the NIST report, a new section, 106.3, is proposed.

Section 106.3 requires that all buildings, with certain exceptions as listed in the section, be subjected to periodic building fire safety inspections in accordance with the requirements of Sections 106.3.1 through 106.3.6. The exception includes dwelling units in Group R-2 and Group R-3 occupancies, Group U occupancies associated with Group R-3 occupancies, and dwelling units constructed in accordance with the International Residential Code.

The purpose of requiring periodic building fire safety inspections is to help ensure that buildings are operated and maintained in accordance with the intent of the International Fire Code, as set forth in Section 101.3. There is little benefit to having an International Fire Code that includes periodic inspection, testing and maintenance requirements intended to ensure that a building is maintained in a safe condition unless there is a mechanism inherent in such code that provides the fire code official with reasonable assurances that they are being complied with. The 18th century phrase "a chain is only as strong as its weakest link" appropriately describes the reality of Building and Fire Codes being adopted in a jurisdiction, but not comprehensively enforced.

The NIST report offers several other recommendations that are not addressed in this proposal. The CTC has investigated all of the NIST recommendations and has, as deemed appropriate, submitted separate code changes in response. These separate code change proposals address the following: fire inspector~~,~~ and fire plan examiner qualifications and certifications; detailed recordkeeping requirements; and required automatic sprinkler protection for existing Group F-1, M and S-1 occupancies that manufacture, store or sell upholstered furniture or mattresses that undergoing an Alteration 3 renovation. It is these proposals, coupled with the proposed requirement for a periodic building fire safety inspection, which will help fire code officials in their efforts to ensure that all buildings, not just buildings storing or selling upholstered furniture and mattresses, are constructed, operated and maintained in a manner that provides a prudent level of fire safety for building occupants and firefighters. The importance of fire prevention in the overall safety to building occupants and the protection of property cannot be overemphasized. It is interesting to note that the report "America Burning", a report published by the Federal Government in the early 1970's, recommended a "balance" of 50/50 between public fire department expenditures on suppression and fire prevention. This report can be found at http://www.usfa.fema.gov/downloads/pdf/publications/fa-264.pdf.

Section 106.3.1 defines the scope of periodic building fire safety inspections to include the maintenance of means of egress, fire-resistant-rated construction, and fire protection systems; evidence of unlawful alterations; compliance with the fire safety and evacuation plan required by Chapter 4 of the Fire Code; recordkeeping, housekeeping and such other requirements as determined by the fire code official.

Section 106.3.2 requires that periodic building fire safety inspections be conducted by the fire code official unless the fire code official determines that the inspection shall be conducted by an approved third party.

Section 106.3.2 acknowledges that the primary and preferred entity authorized to conduct periodic building fire safety inspections is the fire code official, but recognizes that certain jurisdictions may choose to require such inspection to be conducted by an approved third party. This section places no duty or liability on the fire code official to conduct periodic building fire safety inspections, it merely identifies them as the primary and preferred entity to do so.

Section 106.3.3 establishes qualifications for the inspector conducting periodic building fire safety inspections. Such inspector qualification requirement would not apply to buildings that are subjected to a building fire safety inspection program when approved by the fire code official. This section requires that inspectors conducting such inspections, at a minimum, be certified through a recognized fire inspector certification program. If the fire code officials choose to conduct periodic building fire safety inspections, they would be required to have such inspections conducted by individuals that meet this certification requirement. However, as previously stated, the fire code official has no duty or liability to conduct such inspections and therefore no obligation to employ certified inspectors. Approved third party individuals conducting such inspections, except as noted above, would be required to comply with this certification requirement. The section authorizes the fire code official to accept any recognized certification program for such fire inspectors.

Section 106.3.4 requires that the minimum frequency of periodic building fire safety inspections be determined by the fire code official based upon the fire code official's assessment of the risk or once every 5 years. As stated previously, certain buildings, as identified in Section 106.3, would not require periodic building fire safety inspections. For those buildings requiring periodic building fire safety inspections, 5 years was chosen as the maximum time to be allowed between such inspections, unless the fire code official's assessment of the building risk determines that a shorter or longer period should apply.

A building risk assessment would require that many factors be considered on a case-by-case basis, including but not limited to consideration of the building's occupancy Group; occupant load; building height and floor area; construction type and features; fire protection systems; layout and use of the building; size, type and configuration of the fuel load; vulnerability of the building occupants; history and severity of noncompliance with fire safety requirements; incidence of fire and other considerations relevant to the fire risk presented to building occupants and firefighters by such building.

Section 106.3.5 requires that inspection reports for periodic building fire safety inspections conducted by an approved third party be submitted to the fire code official in accordance with the frequency of inspection schedule established by the fire code official. This requirement would help the fire code official identify those buildings not in compliance with the periodic building fire safety inspection requirement. Fire code officials can then take appropriate enforcement action against such building owners to achieve compliance. The proposed change would also allow the fire code official to prescribe the form and format of such report, thereby facilitating its review.

Section 106.3.6 makes it clear that the periodic building fire safety inspection required by Section 106.3 does not limit the fire code official's authority to inspect a building under other provisions of the International Fire Code, including Section 104.3.

The proposed change to Section 113.2 would authorize the fire code official to establish fees associated with implementing a periodic building fire safety inspection program. Jurisdictions that act on this authority would help provide themselves with the economic resource they require to administer the program.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

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

106.3 (NEW)-ADM (IFC)-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The certification program is too narrow. It is necessary to clarify that the 'risk assessment' would allow for both more or less than a 5 year time frame. Would the Group R-2 and R-3 exceptions include residential facilities such as dormitories and congregate residences where there might be the same privacy issues as apartments? The proposal seems to regulate the fire official rather than the building. It is unclear on how the fees for this will be addressed.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert J Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IFC [A] 106.3 Periodic building fire safety inspections. In addition to any other inspections required or authorized by this code, all buildings shall be subjected to periodic building fire safety inspections in compliance with the requirements of Sections 106.3.1 through 106.3.6.

~~**Exceptions:** Periodic building fire safety inspections shall not be required in any of the following:~~

~~1. Buildings classified as Group U occupancies that are associated with Group R-3 occupancies.~~
~~2. Dwelling units in Group R-2 and Group R-3 occupancies.~~
~~3. Dwelling units constructed in accordance with the *International Residential Code.*~~

IFC [A] 106.3.3 Inspector qualifications. *Fire code officials* and *approved* third parties conducting periodic building fire safety inspections required by Section 106.3 shall, at a minimum, be certified through a recognized fire inspector certification program <u>or have a level of applicable experience commensurate with the duties assigned as determined by the jurisdiction</u>.

~~**Exception:** Where the building is subject to a building fire safety inspection program approved by the *fire code official*.~~

IFC [A] 106.3.4 Frequency of inspection. The minimum required frequency of periodic building fire safety inspections shall be determined by the *fire code official* ~~based upon the *fire code official's* assessment of the risk~~ or <u>at least</u> once every 5 years. <u>For low hazard occupancies the fire code official may extend the length of time between periodic inspections beyond 5 years</u>.

IFC [A] SECTION 113
FEES

IFC [A] 113.2 Schedule of ~~permit~~ fees. A fee for each permit, and <u>a</u> fee~~s associated with establishing a program to implement the requirement~~ for periodic building fire safety inspections in accordance with Section 106.3, shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: To address the committee concerns the following modifications were made.

In IFC [A] 106.3 the exceptions are proposed to be deleted. The Scope and Applicability of the Fire Code is already provided for in Sections 101 and 102.

In IFC [A] 106.3.3 language has been added to broaden the qualifications by providing for the jurisdiction to set a level of applicable experience as a qualification.

IFC [A] 106.3.4 was modified to take out a reference to "risk assessment" which caused the greatest objection and to clarify as requested by the committed that the fire code official can set a schedule greater than every five years for some occupancies.

The language in the fee section was clarified. If the jurisdiction establishes a schedule as already permitted by this section for periodic inspections it will apply.

ADM38-13

Final Action: AS AM AMPC____ D

ADM42-13
IBC: [A] 107.1.1 (New)

Proposed Change as Submitted

Proponent: Philip Brazil, P.E., S.E., Senior Structural Engineer, Reid Middleton, Inc., representing self

Add new text to the International Building Code as follows:

IBC [A] 107.1.1 Structural reports and certificates. Structural reports and certificates shall be submitted by the owner or the owner's authorized agent to the *building official* in accordance with Section 1704.5.

Reason: The purpose for this proposal is for correlation with a proposal that adds a new Section 1704.5 specifying submittals to the building official, which are typically related to the structural design of the building or structure, and are typically submitted during construction.

Note that separate proposals:

1. Transfer the requirements of Section 1705.12.1 to new Section 1704.5;
2. Add additional requirements for submittals that are related to structural steel;
3. Add additional requirements for submittals that are related to the welding of concrete reinforcement and anchor bolts;
4. Add additional requirements for submittals that are related to masonry; and
5. Change "the owner" to "the owner or the owner's authorized agent".

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

107.1.1 (NEW)-ADM (IBC)-BRAZIL

Committee Action Hearing Results

Committee Action: **Disapproval**

Committee Reason: Inspections and reports are already generically addressed in Chapter 17. These provisions might be located better in Section 107.2. The language needs to be limited to special inspections.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IBC [A] ~~107.1.1~~ 107.2.6 Structural reports and certificates. Structural reports and certificates shall be submitted by the owner or the owner's authorized agent to the *building official* ~~in accordance with~~ where required by Section 1704.5.

Commenter's Reason: The modification to the proposal responds to the issues raised by the Administrative Provisions Committee. The proposed modification would insert the new section at the end of Section 107.2 where it would follow the other information required to be submitted with construction documents. The new section is modified to state that structural reports would be required only when required by Section 1704.5. While Chapter 17 does require that these reports be submitted, it is helpful to have a provision in Chapter 1 stating that these reports and certificates are part of the construction documents for the permit application. Note that Section 1704.5 was rewritten for the 2015 IBC as part of Group A.

ADM42-13

Final Action: AS AM AMPC____ D

ADM46-13
IBC: [A] 107.3.4.1, 202; IEBC: [A] 106.3.4, 202

Proposed Change as Submitted

Proponent: Maureen Traxler, City of Seattle, representing Seattle Department of Planning and Development (maureen.traxler@seattle.gov)

Revise the International Building Code as follows:

IBC [A] 107.3.4.1 Deferred submittals. ~~For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the *building official* within a specified period.~~

Deferral of any submittal items shall have the prior approval of the *building official*. The *registered design professional in responsible charge* shall list the deferred submittals on the *construction documents* for review by the *building official*.

Documents for deferred submittal items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *building official* with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been *approved* by the *building official*.

Add new definition as follows:

IBC SECTION 202
DEFINITIONS

<u>**DEFERRED SUBMITTAL**. Those portions of the design that are not submitted at the time of the application and that are to be submitted to the *building official* within a specified period.</u>

Revise the International Existing Building Code as follows:

IEBC [A] 106.3.4 Deferred submittals. ~~For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the *code official* within a specified period~~.

Deferral of any submittal items shall have the prior approval of the *code official*. The *registered design professional in responsible charge* shall list the deferred submittals on the construction documents for review by the *code official*.

Submittal documents for deferred submittal items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *code official* with a notation indicating that the deferred submittal documents have been reviewed and that they have been found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until their deferred submittal documents have been approved by the *code official*.

Add new definition as follows:

IEBC SECTION 202
DEFINITIONS

<u>**DEFERRED SUBMITTAL.** Those portions of the design that are not submitted at the time of the application and that are to be submitted to the *code official* within a specified period.</u>

Reason: A definition of "deferred submittal" is buried in IBC Section 107.3.4.1 and IEBC 106.3.4. This proposal moves the definition to Section 202. The term is used at least two places in the code, so placing the definition in Chapter 2 will make it easier to find when applying those sections.

Cost Impact: None.

[A] 107.3.4.1-ADM (IBC)-TRAXLER

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Further revise the International Building Code as follows:

IBC [A] 107.3.4.1 Deferred submittals. ~~Deferral of~~ Any *deferred* *submittal* items shall have the prior approval of the *building official*. The *registered design professional in responsible charge* shall list the deferred submittals on the *construction documents* for review by the *building official*.

Documents for *deferred submittal* items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *building official* with a notation indicating that the *deferred submittal* documents have been reviewed and found to be in general conformance to the design of the building. The *deferred submittal* items shall not be installed until the *deferred submittal* documents have been *approved* by the *building official*.

Further revise the International Existing Building Code as follows:

IEBC [A] 106.3.4 Deferred submittals. ~~Deferral of~~ Any *deferred* *submittal* items shall have the prior approval of the *code official*. The *registered design professional in responsible charge* shall list the *deferred submittals* on the construction documents for review by the *code official*.

Submittal documents for *deferred submittal* items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *code official* with a notation indicating that the *deferred submittal* documents have been reviewed and that they have been found to be in general conformance to the design of the building. The *deferred submittal* items shall not be installed until their *deferred submittal* documents have been approved by the *code official*.

Committee Reason: The modification will use the defined term in the text. 'Deferred submittal' as a defined term is cleaner and easier to understand.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Submitted.

Commenter's Reason: The Code Development Committee approved a floor modification that slightly changed the meaning of IBC Section 107.3.4.1. It's not the deferred items that should have prior approval, it's the deferral of the submittals for those items. This provision is meant to require applicants to get the code official's approval before deferring any submittal. Approval of the deferred submittal items occurs after they've been submitted.

ADM46-13

Final Action: AS AM AMPC____ D

ADM47-13, Part IV
PART II - IECC: C103.4

NOTE: *PARTS I, II & III DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PARTS I, II AND III ARE REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART IV.*

Proposed Change as Submitted

THIS IS A 4 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Michael D. Fischer, Kellen Company, representing the American Institute of Building Design (mfischer@kellencompany.com)

PART IV – IRC

Add new text to the International Residential Code as follows:

IRC R106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

Reason: The code requires that construction documents be kept on file and generally available to the public. The code does not include safeguards to ensure that the building department at the least will honor the copyrighted works that are part and parcel of most projects. Local copy and print centers honor such copyright protection by declining to duplicate copyrighted works without permission of the author. It is not unreasonable to expect similar efforts by governmental agencies.

Cost Impact: None.

R106.6 (NEW)-RB-FISCHER

Committee Action Hearing Results

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the protection afforded in the proposal already exists in federal law. This proposal would not change the application of this section. Drawings are already typically copyrighted.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael D. Fischer, Kellen Company, representing American Institute of Building Design, requests Approval as Modified by this Public Comment.

Replace the proposal with the following:

R106.5 Retention of construction documents. One set of *approved construction documents* shall be retained by the *building official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

R106.5.1 Copyright protection. The *building official* shall issue a notice regarding the departmental policy on improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted information.

Commenter's Reason: During the debate and committee discussion on the original proposal, concerns were raised about potential conflict with state or local public record laws. The proposed modification removes the requirement that the code official establish procedures regarding copyright protection, and replaces it with a requirement to issue a notice outlining the department policy. With notice appropriately provided to the public by the building department, the likelihood that a member of the public will improperly reuse copyrighted materials is lessened. The modification will allow the building official to address the issue of copyright protection while complying with applicable FOIL requirements.

ADM47-13, Part IV
Final Action: AS AM AMPC____ D

NOTE: PARTS I, II & III REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM47 – 13
PART I - IBC: [A] 107.6 (New); IEBC: [A] 106.6 (New); IWUIC: [A] 108.9 (New)
PART II - IECC: C103.6 (New);
PART III - IECC: R103.6 (New);

THIS IS A 4 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Michael D. Fischer, Kellen Company, representing the American Institute of Building Design (mfischer@kellencompany.com)

PART I – IBC; IEBC; IWUIC

Add new text to the International Building Code as follows:

IBC 107.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

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

IEBC 106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

(Renumber subsequent sections)

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

IWUIC 108.9 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

(Renumber subsequent sections)

PART II – IECC-COMMERCIAL

Add new text to the International Energy Conservation Code-Commercial as follows:

R106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

PART III – IECC-RESIDENTIAL

Add new text to the International Energy Conservation Code-Residential as follows:

R106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

Reason: The code requires that construction documents be kept on file and generally available to the public. The code does not include safeguards to ensure that the building department at the least will honor the copyrighted works that are part and parcel of most projects. Local copy and print centers honor such copyright protection by declining to duplicate copyrighted works without permission of the author. It is not unreasonable to expect similar efforts by governmental agencies.

Cost Impact: None.

PART I - IADMIN
Committee Action: **Disapproved**

Committee Reason: Copyright issues are addressed through state law. This is something that should be addressed by an administrative policy of the city worked out by the town council. This is not a code issue and should not be a requirement in the code.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval to allow development of a public comment to address issues raised in debate before other committees.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: Copyright protection should not be the responsibility of the code official, nor should it be a subject of the IECC.

Assembly Action: **None**

ADM52-13, Part II
PART II - IECC: C202;

NOTE: *PARTS I, IV & V DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PARTS I, IV AND V ARE REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART III.*

Proposed Change as Submitted

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

Proponent: Deborah Taylor, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202
GENERAL DEFINITIONS

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in ~~a~~ an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

COMMISSIONING. A protocol included in the construction documents for mechanical and lighting systems, including controls, that establishes a process of testing, balancing, calibrating and adjusting the installed systems to ensure that they function according to *approved* construction documents.

LIGHTING POWER ALLOWANCE. The total input electrical power permitted by this code for lighting in a building, or part thereof as applicable.

LIGHTING POWER DENSITY. The ratio of lighting input power permitted by this code as a function of area served, measured in watts per square foot.

TOTAL CONNECTED LIGHTING POWER. A calculation of the lighting power capacity in a building, or part thereof, or design, performed in accordance with Section C405.5.1 of this code.

WORK. Proposed or actual construction that shall include demolition or installation of materials, equipment or systems related to creating, altering or removing a building, or part thereof.

Reason: The definition for “alteration” needs to acknowledge electrical alterations as well. The added terms are already used in the code and required definition.

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

Staff Analysis: The definition for Alteration also appears in the IFGC and IZC.

C202-ALTERATION-EC-TAYLOR.doc

Public Hearing Results

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The committee preferred the revision of this definition which was approved in ADM51-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Submitted for ADM52-13, Part II.

Commenter's Reason: Because of lighting and controls, electrical work needs to be added to the definition of "alteration." This definition was approved as submitted by the IRC Technical Committee, but disapproved by both the IECC Commercial and Residential Technical Committees. The other terms are used often in the code and should be defined in Chapter 2.

ADM52-13, Part II
Final Action: AS AM AMPC____ D

ADM52-13, Part III
PART III - IECC: R202 (IRC N1101.9);

<u>Proposed Change as Submitted</u>

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

Proponent: Deborah Taylor, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in ~~a~~ <u>an electrical or</u> mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

<u>**COMMISSIONING.** A protocol included in the construction documents for mechanical and lighting systems, including controls, that establishes a process of testing, balancing, calibrating and adjusting the installed systems to ensure that they function according to *approved* construction documents.</u>

<u>**LIGHTING POWER ALLOWANCE.** The total input electrical power permitted by this code for lighting in a building, or part thereof as applicable.</u>

<u>**LIGHTING POWER DENSITY.** The ratio of lighting input power permitted by this code as a function of area served, measured in watts per square foot.</u>

<u>**TOTAL CONNECTED LIGHTING POWER.** A calculation of the lighting power capacity in a building, or part thereof, or design, performed in accordance with Section C405.5.1 of this code.</u>

<u>**WORK.** Proposed or actual construction that shall include demolition or installation of materials, equipment or systems related to creating, altering or removing a building, or part thereof.</u>

Reason: The definition for "alteration" needs to acknowledge electrical alterations as well. The added terms are already used in the code and required definition.

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

Staff Analysis: The definition for Alteration also appears in the IFGC and IZC.

C202-ALTERATION-EC-TAYLOR.doc

Public Hearing Results

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE
Committee Action: **Disapproved**

Committee Reason: The provisions proposed are not needed in the IECC-Residential provisions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval Modified by this Public Comment for ADM52-13, Part III.

Modify the proposal as follows:

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

~~**COMMISSIONING.** A protocol included in the construction documents for mechanical and lighting systems, including controls, that establishes a process of testing, balancing, calibrating and adjusting the installed systems to ensure that they function according to *approved* construction documents.~~

~~**LIGHTING POWER ALLOWANCE.** The total input electrical power permitted by this code for lighting in a building, or part thereof as applicable.~~

~~**LIGHTING POWER DENSITY.** The ratio of lighting input power permitted by this code as a function of area served, measured in watts per square foot.~~

~~**TOTAL CONNECTED LIGHTING POWER.** A calculation of the lighting power capacity in a building, or part thereof, or design, performed in accordance with Section C405.5.1 of this code.~~

WORK. Proposed or actual construction that shall include demolition or installation of materials, equipment or systems related to creating, altering or removing a building, or part thereof.

Commenter's Reason: Because of lighting and controls, electrical work needs to be added to the definition of "alteration." The definition of 'alteration' as originally submitted was approved as submitted by the IRC Technical Committee, but disapproved by both the IECC Commercial and Residential Technical Committees. The term 'work' is used often in the IECC/Residential code and should be defined in Chapter 2. The definitions for "commissioning" and lighting-related work are not used in Chapter 4 of the IECC/Residential Code and have therefore have been removed from the proposal.

ADM52-13, Part III
Final Action: AS AM AMPC____ D

NOTE: PARTS I, IV & V REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM52 – 13
PART I - IBC; IEBC; IFC; IMC;
PART IV - IRC: R202;
PART V - ISPSC 202

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

Proponent: Deborah Taylor, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

PART I – IBC; IEBC; IFC; IMC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

[A] ALTERATION. Any construction or renovation to an *existing structure* other than *repair* or *addition*. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Existing Building Code as follows:

IEBC SECTION 202
DEFINITIONS

[A] ALTERATION. Any construction or renovation to an existing structure other than a *repair* or *addition.* Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit. Alterations are classified as Level 1, Level 2 or Level 3.

Revise the International Fire Code as follows:

IFC SECTION 202
DEFINITIONS

[A] ALTERATION. Any construction or renovation to an *existing structure* other than *repair* or *addition*. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Mechanical Code as follows:

IMC SECTION 202
GENERAL DEFINITIONS

[A] ALTERATION. A change in a mechanical or electrical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

Reason: The definition for "alteration" needs to acknowledge electrical alterations as well. The added terms are already used in the code and required definition.

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

Staff Analysis: The definition for Alteration also appears in the IFGC and IZC.

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a *permit*. Also, a change in ~~a~~ an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202
DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an *existing aquatic vessel* other than repair or addition that requires a permit. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

Reason: The definition for "alteration" needs to acknowledge electrical alterations as well. The added terms are already used in the code and required definition.

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

PART I - IADMIN
Committee Action: **Disapproved**

Committee Reason: The definition for alteration should be left broad. The additional sentence is not needed.

Assembly Action: **None**

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Approved as Submitted**

The following is errata that was not posted to the ICC website.

Modify the proposal as follows:

ALTERATION. Any construction~~, retrofit~~ or renovation to an existing structure other than repair or addition that requires a *permit*. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

Committee Reason: The committee approved this proposed code change because they felt that it provides clarity.

Assembly Action: **None**

PART V - ISPSC
HEARD BY THE ISPSC COMMITTEE

Committee Action: **Disapproved**

The following is errata that was not posted to the ICC website.

Modify the proposal as follows:

ALTERATION. Any construction~~, retrofit~~ or renovation to an *existing aquatic vessel* other than repair or addition that requires a permit. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

Committee Reason: The proposal appears to bring too much scope of coverage into this code that is only for coverage of pools and spas.

Assembly Action: **None**

ADM55-13, Part II
PART II - IECC: C202

NOTE: *PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART V.*

Proposed Change as Submitted

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

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

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202
GENERAL DEFINITIONS

APPROVED. <u>Acceptable to</u> ~~Approval by~~ the code official ~~as the result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by national recognized organizations.~~

Reason: The purpose for the proposal is to clarify the meaning of the definitions for “approved” and “permit” by specifying the building official rather than the “authority having jurisdiction.” The provisions of the building code consistently identify the building official as the official in charge of administration and enforcement of the building code. The only instances of “authority having jurisdiction” in the 2012 IBC are in this proposal.

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

202-APPROVED-ADM-BRAZIL

Committee Action Hearing Results

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: Current text provides the code official guidance regarding what approved means and how something is 'approved'. This proposal removes that guidance.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Submitted.

Commenter's Reason: This proposal would make the definition of "approved" in the IECC consistent with the definition in the Building, Fire, Fuel Gas, Mechanical, Plumbing, Property Maintenance and Wildland Urban Interface codes as approved in Part I of this proposal. The committees disapproved these 2 parts of the proposal because they felt that building officials need guidance to make approvals. However, the other codes do not include the language the Energy Code Committees found necessary. We can see no reason building officials would need additional guidance to make approvals under the Energy Code. The language provides minimal guidance in any case. It doesn't require anything other than what a building official would normally do. "Accepted principles" and "tests by national recognized organizations" are typical standards for approvals. The deleted language allows "investigations" without defining what constitutes an investigation. Presumably making a phone call or reviewing manufacturer information could be considered investigation.

ADM55-13, Part II
Final Action: AS AM AMPC____ D

ADM55-13, Part III
PART III - IECC: R202 (IRC N1101.9)

NOTE: *PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART V.*

Proposed Change as Submitted

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

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

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

APPROVED. Acceptable to ~~Approval by~~ the code official ~~as the result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by national recognized organizations.~~

Reason: The purpose for the proposal is to clarify the meaning of the definitions for "approved" and "permit" by specifying the building official rather than the "authority having jurisdiction." The provisions of the building code consistently identify the building official as the official in charge of administration and enforcement of the building code. The only instances of "authority having jurisdiction" in the 2012 IBC are in this proposal.

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

202-APPROVED-ADM-BRAZIL

Committee Action Hearing Results

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The proposed text would diminish guidance to the code official regarding needed information for approval.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Submitted.

Commenter's Reason: This proposal would make the definition of "approved" in the IECC consistent with the definition in the Building, Fire, Fuel Gas, Mechanical, Plumbing, Property Maintenance and Wildland Urban Interface codes as approved in Part I of this proposal. The committees disapproved these 2 parts of the proposal because they felt that building officials need guidance to make approvals. However, the other codes do not include the language the Energy Code Committees found necessary. We can see no reason building officials would need additional guidance to make approvals under the Energy Code. The language provides minimal guidance in any case. It doesn't require anything other than what a building official would normally do. "Accepted principles" and "tests by national recognized organizations" are typical standards for approvals. The deleted language allows "investigations" without defining what constitutes an investigation. Presumably making a phone call or reviewing manufacturer information could be considered investigation.

ADM55-13, Part III

Final Action: AS AM AMPC____ D

ADM55-13, Part IV
PART IV - IRC: R202

NOTE: *PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART V.*

Proposed Change as Submitted

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

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

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

APPROVED. Acceptable to the *building official*.

PERMIT. An official document or certificate issued by the ~~authority having jurisdiction~~ building official that authorizes performance of a specified activity.

Reason: The purpose for the proposal is to clarify the meaning of the definitions for "approved" and "permit" by specifying the building official rather than the "authority having jurisdiction." The provisions of the building code consistently identify the building official as the official in charge of administration and enforcement of the building code. The only instances of "authority having jurisdiction" in the 2012 IBC are in this proposal.

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

202-APPROVED-ADM-BRAZIL

Committee Action Hearing Results

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because the authority having jurisdiction issues the permit and the building official is the representative of that authority.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Submitted.

Commenter's Reason: The provisions of the International Codes consistently identify the building official as the official in charge of administration and enforcement of the codes. See IRC Section 104 reprinted below. The term "authority having jurisdiction" is not defined and is not used anywhere else in the International Codes. Using it in the definition makes code officials vulnerable to challenges to their authority. It's important that the code state clearly and unequivocally that the code official has ultimate authority to make approvals. This change will make the IRC definitions consistent with the definitions in 7 other codes that were approved in Part I— IBC; IFC; IFGC; IMC; IPC; IPMC; IWUIC.

The reason for disapproval of this part of the proposal misinterprets Chapter 1 of the IRC. Section 104 clearly gives the code official authority sole responsibility to administer this code.

SECTION R104
DUTIES AND POWERS OF THE BUILDING OFFICIAL

R104.1 General. The *building official* is hereby authorized and directed to enforce the provisions of this code. The *building official* shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in conformance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

R104.2 Applications and permits. The *building official* shall receive applications, review *construction documents* and issue permits for the erection and alteration of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

ADM55-13, Part IV
Final Action: AS AM AMPC____ D

ADM55-13, Part V
PART V - ISPSC 202

NOTE: *PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART V.*

Proposed Change as Submitted

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

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

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202
DEFINITIONS

APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction~~.

PERMIT. An official document or certificate issued by the ~~authority having jurisdiction~~ building official that authorizes performance of a specified activity.

Reason: The purpose for the proposal is to clarify the meaning of the definitions for “approved” and “permit” by specifying the building official rather than the “authority having jurisdiction.” The provisions of the building code consistently identify the building official as the official in charge of administration and enforcement of the building code. The only instances of “authority having jurisdiction” in the 2012 IBC are in this proposal.

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

202-APPROVED-ADM-BRAZIL

Committee Action Hearing Results

PART V - ISPSC
HEARD BY THE ISPSC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The permitting of pools might not be controlled by the building official. This proposal removes the flexibility for other authorities having jurisdiction to do permitting and to approve items.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comments.

Modify the proposal as follows:

ISPSC SECTION 202
DEFINITIONS

APPROVED. Acceptable to the *code official*.

PERMIT. An official document or certificate issued by the ~~building~~ code official that authorizes performance of a specified activity.

Commenter's Reason: The provisions of the codes consistently identify the code official as the person in charge of administration and enforcement of the codes. See ISPSC Section 104 reprinted below. The term "authority having jurisdiction" is not defined and is not used anywhere else in the International Codes. Using it in the definition makes code officials vulnerable to challenges to their authority. It's important that the code state clearly and unequivocally that the code official has ultimate authority to make approvals and issue permits. This change will make the ISPSC definitions consistent with the definitions in 7 other codes that were approved in Part I— IBC; IFC; IFGC; IMC; IPC; IPMC; IWUIC.

The reason for disapproval of this part of the proposal misinterprets Chapter 1 of the ISPSC. Section 104 clearly gives the code official authority sole authority to administer this code. Even if other agencies issue permits related to pools and spas, the code official retains responsibility for enforcing the ISPSC and issuing permits under the International Codes. If other agencies issue permits in some jurisdictions, the code official, by definition, may authorize others to perform duties. "**CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative." Disapproval of this proposal would result in inconsistency within the ISPSC between the definition and Section 104, as well as making this Code inconsistent with the other codes.

SECTION 104
DUTIES AND POWERS OF THE CODE OFFICIAL

104.1 General. The *code official* is hereby authorized and directed to enforce the provisions of this code. The code official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

104.2 Applications and permits. The code official shall receive applications, review construction documents and issue permits for the erection, alteration, demolition and moving of aquatic vessels, related mechanical, electrical, plumbing systems, to inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

ADM55-13, Part V

Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM55 – 13
PART I - IBC: 202, IFC: 202, IFGC: 202, IMC: 202, IPC: 202, IPMC: 202, IWUIC: 202

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

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

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

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to the *building official* ~~or authority having jurisdiction~~.

[A] PERMIT. An official document or certificate issued by the ~~authority having jurisdiction which~~ building official that authorizes performance of a specified activity.

Revise the International Fire Code as follows:

IFC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to the *fire code official*.

[A] PERMIT. An official document or certificate issued by the ~~authority having jurisdiction which~~ fire code official that authorizes performance of a specified activity.

Revise the International Fuel Gas Code as follows:

IFGC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction~~.

Revise the International Mechanical Code as follows:

IMC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction~~.

Revise the International Plumbing Code as follows:

IPC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction~~.

Revise the International Property Maintenance Code as follows:

IPMC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to ~~Approved by~~ the *code official*.

Revise the International Wildland-Urban Interface Code as follows:

IWUICC SECTION 202
DEFINITIONS

[A] APPROVED. Acceptable to the code official ~~Approval by the code official as the result of review, investigation or tests conducted by the code official or by reason of accepted principles or tests by national authorities, or technical or scientific organizations.~~

Reason: The purpose for the proposal is to clarify the meaning of the definitions for "approved" and "permit" by specifying the building official rather than the "authority having jurisdiction." The provisions of the building code consistently identify the building official as the official in charge of administration and enforcement of the building code. The only instances of "authority having jurisdiction" in the 2012 IBC are in this proposal.

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

PART I - IADMIN
Committee Action: **Approved as Submitted**

Committee Reason: The phrase 'authority having jurisdiction' is already addressed in the definition for code official, therefore, it can be removed from the definition for the term permit and approved. This revision would coordinate the codes and is preferred to the options for the term 'approved' offered in ADM53 and ADM 54.

Assembly Action: **None**

ADM60-13, Part V
PART V - ISPSC: 202

***NOTE:** PARTS I, II, III & IV DID NOT RECEIVE A PUBLIC COMMENT AND ARE ON THE CONSENT AGENDA. PARTS I, II, III, AND IV ARE REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART V.*

Proposed Change as Submitted

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

Proponent: Maureen Traxler, City of Seattle, representing Seattle Department of Planning and Development (maureen.traxler@seattle.gov)

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202
DEFINITIONS

REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing *aquatic vessel* for the purpose of its maintenance or to correct damage.

Reason: We are proposing the definition be modified in each of the codes in which it appears. The identical definition appears in the IBC, IEBC, IRC and ISPSC--4 of the 6 ICC codes in which it appears. The IECC definition is “The reconstruction or renewal of any part of an existing building.” Note that the term is not defined in the IFC, IMC, IFGC, IPC or IPSDC. The definition of ‘repair’ in the IGCC definition is identical except that it includes building sites as well as buildings, and can be addressed in Group C.

Limiting repairs to maintenance is not consistent with the use of the term in the codes. IBC Section 3405.1 and IEBC Section 404.1, Repairs, specifically state that repair includes correction of damage. “Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter.” IEBC Section 606.2 deals with repairs to damaged buildings—explicitly including correction of damage, which in many cases would be more than “maintenance”.

Another possible solution to this inconsistency would be to delete the phrase “for the purpose of its maintenance” as the term is defined in the IECC. However, adding damage to the existing definition more clearly distinguishes repairs from alterations.

Cost Impact: None.

Committee Action Hearing Results

PART V - ISPSC
HEARD BY THE ISPSC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The phrase “to correct damage” is too specific and unnecessary.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Submitted.

Commenter's Reason: This is a five-part proposal; four parts were approved. The proposal makes the definition of "repair" consistent in all the codes where it is used. The proposal also makes the definition consistent with the common use of the term to refer to correction of damage as repair.

ADM60-13, Part V

Final Action: AS AM AMPC____ D

NOTE: PARTS I, II, III AND IV REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

ADM60 – 13
PART I - IBC: 202; IEBC: 202;
PART II - IECC: C202;
PART III - IECC: R202 (IRC N1101.9);
PART IV - IRC: R202

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

Proponent: Maureen Traxler, City of Seattle, representing Seattle Department of Planning and Development (maureen.traxler@seattle.gov)

PART I – IBC; IEBC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

[A] REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance<u> or to correct damage</u>.

Revise the International Existing Building Code as follows:

IEBC SECTION 202
DEFINITIONS

[A] REPAIR. The ~~restoration to good or sound condition~~ <u>reconstruction or renewal</u> of any part of an existing building for the purpose of its maintenance<u> or to correct damage</u>.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202
GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building <u>for the purpose of its maintenance or to correct damage</u>.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage. For definitions applicable in Chapter 11, see Section N1101.

PART I - IADMIN
Committee Action: **Approved as Submitted**

Committee Reason: The revision to the term 'repair' cleans up the difference between the terms repair and alteration. This proposal will also provide consistency throughout the code.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The proposal results in the identical definition of repair in multiple International Codes.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: This proposed change would provide consistency with other I-Codes.

Assembly Action: **None**

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it clarifies what the code is commonly interpreted to intend. This action is consistent with prior committee action on ADM60 Part I.

Assembly Action: **None**

ADM61-13
IRC: R202

Proposed Change as Submitted

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

Proponent: Paul Armstrong, PE, CBO; Orange Empire Chapter – Code Committee, Orange Empire Chapter

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

IRC TOWNHOUSE. A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with <u>open space</u> ~~a *yard* or public way~~ on at least two or more sides.

Reason: The purpose of this change is to coordinate the definitions of Townhouse between the IRC and IBC. The proposal intends to use the definition in the 2012 IBC in both codes. The current inconsistency found is a problem in determining the application of the codes. The example is a townhouse design using a court on one of the sides. The IBC in the Scope, Section 101.2, would refer the designer to the IRC for the design of the project but the IRC, based on its definition, would not be allowed whether the project meets all the other criteria or not. So the user is back to the IBC and its definition does allow the design of the project. However, there are no provisions specific for townhouses in the IBC. So the definition the IBC is really only useful for determining the application of the IRC or IBC and needs to be consistent between the two codes.

Definitions are vital in understanding the application of all codes. While differences can exist between codes in the ICC family of codes, those definitions that are used in determining the application of one code or another should be consistent.

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

Staff Analysis: Townhouse is defined in the IBC and IRC.

R202-TOWNHOUSE-RB-ARMSTRONG

Committee Action Hearing Results

HEARD BY IRC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that "open-space" is vague whereas "yard" and "public way" are defined. Open space does not necessarily mean open to the sky. While the definition for townhouse should be consistent between the IBC and the IRC, it is felt that the revision should be to the IBC version to use the defined terms of 'yard' and 'public way.'

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Paul Armstrong, CSG Consultants, Inc., representing Orange Empire Chapter Code Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IBC SECTION R202
DEFINITIONS

IBC TOWNHOUSE. A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with ~~open space~~ a *yard* or public way on at least two or more sides.

Commenter's Reason: The intent of the original proposal was to coordinate the definition of townhouse between the IBC and IRC.

The committee's reason for disapproval was the following:

> The committee disapproved this code change proposal because they felt that "open-space" is vague whereas "yard" and "public way" are defined. Open space does not necessarily mean open to the sky. While the definition for townhouse should be consistent between the IBC and the IRC, it is felt that the revision should be to the IBC version to use the defined terms of 'yard' and 'public way.'

ADM61-13
Final Action: AS AM AMPC____ D

ADM62-13

Proposed Change as Submitted

ADM62-13

IBC, IECC, IEBC, IFC, IFGC, IgCC, IMC, IPC, IPMC, IRC, and the ISPSC

The following table provides a comprehensive list of all standards that the respective standards promulgators have indicated have been, or will be, updated from the listing in the 2012 Editions of the International Codes. According to Section 4.5.1 of ICC Council Policy #CP 28, Code Development Policy, the updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee. Therefore, referenced standards that are to be updated for the 2015 edition of any of the I-Codes are listed in this single code change proposal. Note that the table below indicates the change to the standard, and the code or codes in which each standard appears. The list includes standards that the promulgators have already updated or will have updated by December 1, 2014.

> ****4.5.1 Standards referenced in the I-Codes:** The updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee in accordance with these full procedures except that the deadline for availability of the updated standard and receipt by the Secretariat shall be December 1 of the third year of each code cycle. The published version of the new edition of the Code which references the standard will refer to the updated edition of the standard. If the standard is not available by the deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued. Multiple standards to be updated may be included in a single proposal.*

AA	Aluminum Association								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ADM 1-~~2010~~ 2015	Aluminum Design Manual: Part I Specification for Aluminum Structures	IBC							
AAMA	**American Architectural Manufacturers Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
450-~~09~~ 10	Voluntary Performance Rating Method for Mulled Fenestration Assemblies	IRC							
506-~~08~~ 11	Voluntary Specifications for Hurricane Impact and Cycle Testing of Fenestration Products	IRC							
711-~~07~~ 13	Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products	IRC							
1402-~~86~~ 09	Standard Specification for Aluminum Siding, Soffit and Fascia	IBC							
ACCA	**Air Conditioning Contractors of America**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
Manual D-~~09~~ 2011	Residential Duct Systems	IMC	IRC						
Manual J-2011	Residential Load Calculation - Eighth Edition	IRC	IECC-R						
Manual S-~~10~~ 13	Residential Equipment Selection	IRC	IECC-R						

180-~~2008~~ 2012	Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems	IMC	IRC						
183-2007 (reaffirmed 2011)	Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings	IMC	IECC						
ACI	**American Concrete Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
216.1-~~07~~ 14	~~Standard Method~~ Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	IBC							
304.2R-~~04~~ 96	Placing Concrete by Pumping Methods (Reapproved 2008)	ISPSC							
305.1-~~06~~ 14	Specification for Hot Weather Concreting	ISPSC							
308.1-~~98~~ 11	~~Standard~~ Specification for Curing Concrete	ISPSC							
318-~~11~~ 14	Building Code Requirements for Structural Concrete	IBC	IRC	ISPSC					
332-~~10~~ 14	Residential Code Requirements for Structural Concrete Construction	IRC							
506.2-~~95~~ 13	Specification for Shotcrete	ISPSC							
530-~~11~~ 13	Building Code Requirements for Masonry Structures	IBC	IRC						
530.1-~~11~~ 13	Specifications for Masonry Structures	IBC	IRC						
~~AF&PA~~ AWC	**~~American Forest & Paper Association~~ American Wood Council**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
~~AF&PA~~ AWC STJR~~—2012~~ 2015	Span Tables for Joists and Rafters	IBC	IRC						
~~ANSI/AF&PA~~ AWC WFCM~~—2012~~ 2015	Wood Frame Construction Manual for One- and Two-Family Dwellings	IBC	IRC						
ANSI/AWC NDS-~~2012~~ 2015	National Design Specification (NDS) for Wood Construction - with 2012 Supplement	IBC	IRC						
~~ANSI/AF&PA~~ AWC SDPWS~~—2008~~ 2015	Special Design Provisions for Wind and Seismic	IBC							
~~AF&PA~~ AWC WCD No. 4-2003	Wood Construction Data-Plank and Beam Framing for Residential Buildings	IBC							
ANSI/~~AF&PA~~ AWC PWF~~—2007~~ 2015	Permanent Wood Foundation Design Specification	IBC	IRC						
AHRI	**Air Conditioning, Heating and Refrigeration Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
210/240-2008 with Addenda 1 and 2	Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment	IECC-C							
310/380-2004 (CSA - C744-04)	Standard for Packaged Terminal Air-Conditioners and Heat Pumps	IECC-C							

340/360-2007 with Addendum 2	Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment	IECC-C							
365 (I-P)-2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units	IECC-C							
366 (SI)-2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units	IECC-C							
400-2001 with Addenda 1 and 2	Liquid to Liquid Heat Exchangers ~~with Addendum 2~~	IECC-C							
440-2008	Performance Rating of Room Fan-Coils	IECC-C							
460-2005	Performance Rating of Remote Mechanical-Draft Air-Cooled Refrigerant Condensers	IECC-C							
550/590-~~03~~ 2011 with Addendum 1	Performance Rating of Water-Chilling ~~Packages~~ and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle ~~with Addenda~~	IECC-C							
700- ~~2006~~ 2011 with Addendum 1	~~Purity~~ Specifications for Fluorocarbon ~~and Other~~ Refrigerants	IECC-C							
870-20~~09~~ 05	Performance Rating of Direct Geoexchange Heat Pumps	IECC-C							
1160-~~08~~ (I-P) 09	Performance Rating of Heat Pump z21.56	IECC-C	ISPSC						
116~~0~~1 (SI)- ~~08~~ -2011	Performance Rating of Heat Pump Pool Heaters	IECC-C	ISPSC						
13256-1~~(2005)~~ (2011)	~~Water-Source Heat Pumps –~~ Water-to-Air and Brine-to-Air Heat Pumps – Testing and Rating for Performance: ~~Part 1 -~~	IECC-C							
13256-2~~(1998)~~ (2011)	~~Water-source Heat Pumps~~ Water-to-Water and Brine-to-water Heat Pumps - Testing and Rating For Performance: ~~Part 2:~~	IECC-C							
AISI	**American Iron and Steel Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
AISI S100-07/S2-~~10~~ 12	North American Specification for the Design of Cold Formed Steel Structural Members ~~with Supplement 2, dated 2010~~ 2012	IBC	IRC						
AISI S110-07/S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems-Special Moment Frames, 2007 with Supplement 1, dated 2009, (2012)	IBC							
AISI S200-~~07~~ 2012	North American Standard for Cold-Formed Steel Framing - General Provisions	IBC							

AISI S210-~~07~~ 2012	North American Standard for Cold-formed Steel Framing-Floor and Roof System Design, 2007, (2012)	IBC								
AISI S211-07/S1-12 (2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, 2007, including Supplement 1, dated 2012, (2012)	IBC								
AISI S212-~~07~~ (2012)	North American Standard for Cold-Formed Steel Framing-Header Design, 2007, (2012)	IBC								
AISI S213-07/S1-~~09~~ (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (2012)	IBC								
AISI S214-~~07~~ 12	North American Standard for Cold-Formed Steel Framing - Truss Design with Supplement 2, dated ~~2008~~, 2012	IBC								
AISI S230-07~~-07/S2-08~~ /S3-12 (2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, 2007, with Supplement ~~2~~ 3, dated ~~2008~~ dated 2012, (2012)	IRC	IBC							
~~AITC~~	**~~American Institute of Timber Construction~~** ***(Please note that the AITC is no longer promulgating ICC standards. Standards previously promulgated by AITC are now being handled by APA and WCLIB.)***									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
ALI	**Automotive Lift Institute**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
ALI/ALCTV-~~2006~~ 2011	Standard for Automotive Lifts - Safety Requirements for Construction, Testing, and Validation ~~(ANSI)~~	IBC								
AMCA	**Air Movement and Control Association International**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
205-~~10~~ 12	Energy Efficiency Classification for Fans	IgCC								
220-~~05~~ 08	Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating	IgCC								
500D-~~10~~ 12	Laboratory Methods for Testing Dampers for Rating	IECC-C								
ANSI	**American National Standards Institute**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
Z97.1- ~~09~~ 2014	Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test	IBC	IRC							
ANSI A137.1-~~88~~ 2012	American National Standard Specifications for Ceramic Tile	IBC	IRC							

Z21.50/CSA 2.22-~~2007~~ 2012	Vented Gas Fireplaces	IRC	IFGC	IgCC					
Z21.88/CSA 2.33-~~09~~ 2015	Vented Gas Fireplace Heaters	IRC	IFGC	IgCC					
LC 1/CSA 6.26-~~2005~~ 2013	Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)	IFGC							
LC 4/CSA 6.32-~~2007~~ 2012	Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems	IFGC	IRC						
Z21.1-~~2005~~ 2010	Household Gas Cooking Appliances	IFGC	IRC						
Z21.5.1/CSA 7.1-~~2006~~ 2014	Gas Clothes Dryers - Volume I - Type 1 Clothes Dryer	IFGC	IRC						
Z21.5.2/CSA 7.2-~~2005~~ 2014	Gas Clothes Dryers - Volume II - Type 2 Clothes Dryer	IFGC							
Z21.10.1/CSA 4.1-~~2009~~ 2012	Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less	IFGC	IRC						
Z21.10.3/CSA 4.3-~~2004~~ 2011	Gas Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating or Instantaneous	IFGC	IRC						
Z21.11.2-~~2007~~ 2011	Gas-Fired Room Heaters - Volume II - Unvented Room Heaters	IFGC	IRC						
Z21.13/CSA 4.9-~~2010~~ 2011	Gas-Fired Low Pressure Steam and Hot Water Boilers	IFGC	IRC						
A21.40.1/CSA 2.91-96 (R~~2002~~ 2011)	Gas-Fired Heat Activated Air Conditioning and Heat Pump Appliances	IFGC	IRC						
Z21.40.2/CSA 2.92-96 (R~~2002~~ 2011)	Air-Conditioning and Heat Pump Appliances (Thermal Combustion)	IFGC	IRC						
Z21.42-~~1993 (R2002)~~ 2014	Gas-Fired Illuminating Appliances	IFGC	IRC						
Z21.47/CSA 2.3-~~2007~~ 2012	Gas-Fired Central Furnaces	IFGC	IRC						
Z21.50/CSA 2.22-~~2006~~ 2012	Vented Gas Fireplaces	IFGC	IRC						
Z21.56/CSA 4.7-~~2007~~ 2013	Gas-Fired Pool Heaters	IFGC	ISPSC	IRC					
Z21.58/CSA 1.6-~~2003~~ 2013	Outdoor Cooking Gas Appliances	IFGC	IRC						
Z21.60/CSA 2.26-~~2003~~ 2012	Decorative Gas Appliances for Installation in Solid-fuel Burning Fireplaces	IFGC	IRC						
Z21.80/CSA 6.22-~~2003 (R2008)~~ 2011	Line Pressure Regulators	IFGC	IRC						
Z21.84-~~2002~~ 2012	Manually-lighted, Natural Gas Decorative Gas Appliances for Installation in Solid Fuel Burning Fireplaces	IFGC	IRC						
Z21.88/CSA 2.33-~~2009~~ 2015	Vented Gas Fireplace Heaters	IFGC	IRC						
Z21.97-~~2009~~ 2012	Outdoor Decorative Appliances	IFGC	IRC						
Z83.4/CSA 3.7-~~2003~~ 2012	Non-Recirculating Direct Gas-fired Industrial Air Heaters	IFGC							
~~Z83.6-90 (R1998)~~ withdrawn replaced with Z83.19 & Z83.20	Gas-fired Infrared Heaters	IFGC	IRC						
Z83.11/CSA 1.8-~~2006~~ 2013	Gas Food Service Equipment	IFGC							
Z83.18-~~2004~~ 2012	Recirculating Direct Gas-fired Industrial Air Heaters	IFGC							
Z83.19-2001 (R~~2005~~ 2009)	Gas-fired High Intensity Infrared Heaters	IFGC	IRC						
~~Z124.1-95~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Bathtub Units~~ Plumbing Fixtures	IPC	IRC						
~~Z124.1.2-2005~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Bathtub and Shower Units~~ Plumbing Fixtures	IPC	IRC						
~~Z124.2-95~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Shower Receptors and Shower Stalls~~ Plumbing Fixtures	IPC	IRC						

~~Z124.3-95~~ replaced with CSA B45.5-11/ IAPMO Z124~~-~~11	Plastic ~~Lavatories~~ Plumbing Fixtures	IPC	IRC						
~~Z124.4-96~~ replaced with CSA B45.5-11/ IAPMO Z124~~-~~11	Plastic ~~Water Closet Bowls and Tanks~~ Plumbing Fixtures	IPC	IRC						
~~Z124.6-97~~ replaced with CSA B45.5-11/ IAPMO Z124~~-~~11	Plastic ~~Sinks~~ Plumbing Fixtures	IPC	IRC						
~~Z124.7-97~~ replaced with IAPMO Z124.7-2012	Prefabricated Plastic Spa Shells	ISPSC							
~~Z124.9 -94~~ replaced with CSA B45.5-11/ IAPMO Z124~~-~~11	Plastic ~~Urinal Fixtures~~ Plumbing Fixtures	IPC	IRC						
APA	**APA -The Engineered Wood Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ANSI~~/AITC~~ A 190.1 – ~~07~~ 12	Structural Glued-Laminated Timber	IBC	IRC	IgCC					
APA E30-~~03~~ 11	Engineered Wood Construction Guide	IRC							
APA PDS ~~04~~ 12	Panel Design Specification	IBC							
APA PDS Supplement 5-~~08~~ 12	Design and Fabrication of All-Plywood Beams (revised ~~2008~~ 2013)	IBC							
APA PDS Supplement 1-~~90~~ 12	Design and Fabrication of Plywood Curved Panels (revised ~~1995~~ 2013)	IBC							
APA PDS Supplement 4-~~90~~ 12	Design and Fabrication of Plywood Sandwich Panels (revised ~~1993~~ 2013)	IBC							
APA PDS Supplement 3-~~90~~ 12	Design and Fabrication of Plywood Stressed-skin Panels (revised ~~1996~~ 2013)	IBC							
APA PDS Supplement 2-~~92~~ 12	Design and Fabrication of Glued Plywood-lumber Beams (revised ~~1998~~ 2013)	IBC							
EWS R540-~~02~~ 12	Builders Tips: Proper Storage and Handling of Glulam Beams	IBC							
EWS S475-~~01~~ 07	Glued Laminated Beam Design Tables	IBC							
EWS S560-~~03~~ 10	Field Notching and Drilling of Glued Laminated Timber Beams	IBC							
EWS T300-~~05~~ 07	Glulam Connection Details	IBC							
EWS X440-~~03~~ 08	Product Guide - Glulam	IBC							
API	**API –American Petroleum Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
Publ 2009 7th Edition (2002, R2012)	Safe Welding and Cutting Practices in Refineries, Gas Plants and Petrochemical Plants	IFC							
Publ 2023 3rd Edition (R2001, R2006)	Guide for Safe Storage and Handling of Heated Petroleum-Derived Asphalt Products and Crude Oil Residue	IFC							
Publ 2028 3rd Edition (2002, R2012)	Flame Arrestors in Piping Systems	IFC							
Publ 2201 5th Edition (2003, 2010)	Procedures for Welding or Hot Tapping on Equipment in Service	IFC							
RP 651 ~~(1997)~~ 3rd Edition (2007)	Cathodic Protection of Aboveground Petroleum Storage	IFC							

	Tanks								
RP 752 ~~(2003)~~ 3rd Edition (2009)	Management of Hazards Associated with Location of Process Plant Buildings, CMA Manager's Guide	IFC							
RP 1604 (1996) 3rd Edition, R2010)	Closure of Underground Petroleum Storage Tanks	IFC							
RP 1615 ~~(1996)~~ 6th Edition (2011)	Installation of Underground Petroleum Storage Systems	IFC							
RP 2001 ~~(2005)~~ 9th Edition (2012)	Fire Protection in Refineries	IFC							
RP 2350 ~~(2005)~~ 4th Edition (2012)	Overfill Protection for Storage Tanks in Petroleum Facilities, 3rd Edition	IFC							
RP 2003 ~~(1998)~~ 7th Edition (2008)	Protection Against Ignitions Arising out of Static, Lightening, and Stray Currents	IFC							
Spec 12P 3rd Edition ~~(1995)~~ (Reaffirmed ~~2000~~)	Specification for Fiberglass Reinforced Plastic Tanks	IFC							
Std 653 (~~2001~~) 4th Edition (~~2000~~) (2009)	Tank Inspection, Repair, Alteration and Reconstruction	IFC							
Std 2015 6th Edition (2001, R2006)	Safe Entry and Cleaning of Petroleum Storage Tanks	IFC							
Std 2000 6th Edition ~~(1998)~~ 2009	Venting Atmosphere and Low-pressure Storage Tanks: Nonrefrigerated and Refrigerated	IFC							
APHA	**American Public Health Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
~~2005~~ 2012	Standard Methods for Examination of Water and Waste water 2~~1~~ 2nd Edition	IgCC							
APSP	**The Association of Pool & Spa Professionals**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ANSI/~~NSPI~~ APSP/ICC 3-~~99~~ 2013	Standard for Permanently Installed Residential Spas	IRC							
ANSI/~~NSPI~~ APSP/ICC 4-~~2007~~ 2012	Standard for Above-ground/On-ground residential swimming pools	IRC							
ANSI/~~NSPI~~ APSP/ICC 5-~~2003~~ 2011	Standard for Residential In-Ground Swimming Pools	IRC							
ANSI/~~NSPI~~ APSP/ICC 6-~~2009~~ 2013	Standard for Residential Portable Spas	IRC							
ANSI/APSP/ICC 7-~~06~~ 2013	Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins	IBC	IRC	ISPSC					
ANSI/APSP/ICC 14-11	Portable Spa Energy Efficiency Standard	IPSPC							
ANSI/APSP/ICC 15-11	Standard for Energy Efficiency for Residential Inground Swimming Pools and Spas with Addenda A Approved 2013)	ISPSC							

ANSI/APSP/ICC16-11	Standard for Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs	ISPSC							
ASABE	**American Society of Agricultural & Biological Engineers**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
EP 559.1 ~~1997~~ W/Corr. 1 ~~DEC 1996 (R2008)~~ AUG2010	Design Requirements and Bending Properties for Mechanically Laminated Wood ~~Columns~~ Assemblies	IBC							
EP 486.~~1~~ 2 ~~DEC 1999 (R2005)~~ OCT2012	Shallow Post and Pier Foundation Design	IBC							
EP542~~-~~ FEB1999 ~~99~~(R2009)	Procedures for Using and Reporting Data Obtained with the Soil Cone Penetrometer	IgCC							
S313.3~~-99~~ FEB1999 (R2009)	Soil Cone Penetrometer	IgCC							
ASCE/SEI	**American Society of Civil Engineers/Structural Engineers Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
5—~~11~~ 13	Building Code Requirements for Masonry Structures	IBC	IRC						
6—11 13	Specification for Masonry Structures	IBC	IRC						
7—10	Minimum Design Loads for Buildings and Other Structures with Supplement No. 1	IBC	IEBC	IRC					
8~~—02~~ 14	Standard Specification for the Design of Cold-formed Stainless Steel Structural Members	IBC							
24-~~05~~ 13	Flood Resistant Design and Construction	IBC	ISPSC	IRC					
29-~~05~~ 14	Standard Calculation Methods for Structural Fire Protection	IBC							
~~31-03~~ 41-13 Note: will be incorporated into ASCE 41-13	Seismic Evaluation and Retrofit ~~Rehabilitation~~ of Existing Buildings	IEBC							
32-01	Design and Construction of Frost Protected Shallow Foundations	IBC	IRC						
41-~~06~~ 13	Seismic Evaluation and Retrofit ~~Rehabilitation~~ of Existing Buildings	IEBC							
ASHRAE	**American Society of Heating, Refrigerating and Air Conditioning Engineers**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
15-~~2010~~ 2013	Safety Standard for Refrigeration Systems	IMC							

34-~~2010~~ 2013	Designation and Safety Classification of Refrigerants	IRC	IMC						
52.2-~~2007~~ 2012	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size	IgCC							
55-~~2004~~ 2010	Thermal Environmental Conditions on Human Occupancy	IgCC							
62.1-~~2010~~ 2013	Ventilation for Acceptable Indoor Air Quality	IMC	IECC	IEBC	IgCC				
90.1-~~2010~~ 2013	Energy Standard for Buildings Except Low-Rise Residential Buildings including Addendum G (ANSI/ASHRAE/IESNA 90.1-2007)	IECC	IgCC						
140-20~~10~~ 11	Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs	IECC							
146-~~2006~~ 2011	Testing for Rating Pool Heaters	IECC							
180-~~08~~ 2012	Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems	IMC							
ANSI/ASHRAE/ACCA 183-2007 (RA2011)	Peak Cooling and Heating Load Calculations in Buildings, Except Low-rise Residential Buildings	IECC							
ASHRAE-~~2004~~ 2012	HVAC Systems and Equipment Handbook - 2004	IMC	IECC						
ASHRAE-~~2009~~ 2013	ASHRAE Handbook of Fundamentals	IRC	IECC-R	IMC					
13256-1~~(2005)~~ 1998 (RA 2012)	Water-source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-Air and Brine-to-Air Heat Pumps (ANSI/ASHRAE/IESNA 90.1-2004)	IECC							
ASME	**American Society of Mechanical Engineers**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ASME A17.1/CSA B44~~—2007~~2013	Safety Code for Elevators and Escalators	IBC	IFC	IEBC	IRC	IPMC			
A112.1.3-2000(R~~eaffirmed~~ 200~~5~~ 11)	Air Gap Fittings for Use with Plumbing Fixtures, Appliances, and Appurtenances	IPC	IRC						
A112.3.4-2000 (R~~eaffirmed~~ 2004) replaced with ASME A112.3.4-2013/CSA B45.9-13	Macerating Toilet Systems and Related Components	IPC	IRC						
A112.4.1-~~1993 (Reaffirmed 2002)~~ 2009	Water Heater Relief Valve Drain Tubes	IPC	IRC						
A112.4.2-~~2003 (R2008~~) 2009	Water Closet Personal Hygiene Devices	IPC							
A112.4.3-1999 (R~~eaffirmed~~ 200~~4~~ 10)	Plastic Fittings for Connecting Water Closets to the Sanitary Drainage System	IPC	IRC						
A112.6.1M-1997 (R~~eaffirmed~~ 200~~2~~ 08)	Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use	IPC	IRC						
A112.6.2-2000 (R~~eaffirmed~~ 200~~4~~ 10)	Framing-Affixed Supports for Off-the-Floor Water Closets with Concealed Tanks	IPC	IRC						
A112.6.3-2001(R~~eaffirmed~~ 2007)	Floor and Trench Drains	IPC	IRC						
A112.6.7-~~2001(Reaffirmed 2007)~~ 2010	Enameled and Epoxy Coated Cast Iron and PVC Plastic Sanitary Floor Sinks	IPC							

A112.6.9-2005 (R2010)	Siphonic Roof Drains	IPC							
ASME A112.18.1-~~2005~~ 2012/ CSA B125.1-~~2005~~ 2012	Plumbing Supply Fittings	IPC	IRC						
ASME A112.18.2-~~2005~~ 2011/ CSA B125.2-~~2005~~ 2011	Plumbing Waste Fittings	IPC	IRC						
ASME A112.19.1-2013/ CSA B45.2-~~08~~ 13	Enameled Cast-Iron and Enameled Steel Plumbing Fixtures	IPC	IRC						
ASME A112.19.2-~~2008~~ 2013/ CSA B45.1-~~08~~ 13	Ceramic Plumbing Fixtures	IPC	IRC						
ASME A112.19.3-2008/ CSA B45.4-08(R2013)	Stainless-Steel Plumbing Fixtures	IPC	IRC						
ASME A112.19.5-2011/ CSA/B45.15-~~09~~ 11	Flush Valves and Spuds ~~Trim~~ for Water Closets, Urinals ~~Bowls~~ and Tanks	IPC	IRC						
ASME A112.19.7-2012/ CSA B45.10-~~09~~ 2012	Hydromassage Bathtubs ~~Appliances~~ Systems	IPC	IRC						
B16.1-~~2005~~ 2010	~~Cast~~ Gray Iron Pipe Flanges and Flanged Fittings~~, Classes 25, 125 and 250~~	IFGC							
B16.3-~~2006~~ 2011	Malleable Iron Threaded Fittings Classes 150 and 300	IPC	IRC	IMC					
B16.4~~—2006~~ 2011	Gray Iron Threaded Fittings ~~Class 125 and 250~~	IPC	IRC						
B16.5-~~2003~~ 2009	Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24	IMC							
B16.11-~~2005~~ 2011	Forged Fittings, Socket-Welding and Threaded	IPC	IRC	IMC					
B16.12-~~1998 (Reaffirmed 2006)~~ 2009	Cast Iron Threaded Drainage Fittings	IPC	IRC						
B16.15-~~2006~~ 2011	Cast Bronze Threaded Fittings	IRC	IMC	IPC	IPSPC				
B16.18-~~2001 (Reaffirmed 2005)~~ 2012	Cast Copper Alloy Solder Joint Pressure Fittings	IPC	IBC	IRC	IMC	IFC			
B16.20-~~1998(Reaffirmed~~ 2007~~)~~	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed	IFGC							
B16.22-2001~~(Reaffirmed 2005)~~ (R2010)	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings	IPC	IBC	IRC	IFC	IMC			
B16.23-~~2002 (Reaffirmed 2006)~~ 2011	Cast Copper Alloy Solder Joint Drainage Fittings: DWV	IPC	IRC	IMC					
B16.24-~~2006~~ 2011	Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500	IMC							
B16.26-~~2006~~ 2011	Cast Copper Alloy Fittings for Flared Copper Tubes	IPC	IRC	IMC					
B16.29-~~2007~~ 2012	Wrought Copper and Wrought-Copper-Alloy Solder Joint Drainage Fittings - (DWV)	IPC	IRC	IMC					
B16.33-~~2002(Reaffirmed 2007)~~ 2012	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes 1/2 through 2)	IFGC	IRC						
B31.1-~~2007~~ 2012	Power Piping	IFC							
B31.3-~~2004~~ 2012	Process Piping	IBC	IFC						
B31.4-~~2006~~ 2012	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids	IFC							
B31.9~~—08~~ 2011	Building Services Piping	IFC	IMC						
ASSE 1016/ASME A112.1016/CSA B125.16-2011 is a replacement for ASSE 1016-2010	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC					

BPVC-~~2007~~ 2010/2011 addenda	Boiler & Pressure Vessel Code	IFC	IMC	IFGC	IRC				
CSD-1-~~2009~~ 2011	Controls and Safety Devices for Automatically Fired Boilers	IMC							
ASPE	**American Society of Plumbing Engineers**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
45-~~2007~~ 2013	Siphonic Roof Drainage Systems	IPC							
ASSE	**American Society of Sanitary Engineering**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
~~1016-2010~~ ASSE 1016/ASME A112.1016/CSA B125.16-2011	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC					
ASTM	**ASTM International**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
A53/A 53M-~~07~~ 12	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	IPC	IMC	IRC	IFGC				
A74-~~09~~ 12	Specification for Cast Iron Soil Pipe and Fittings	IPC	IRC	IPSDC					
A82/A 2M-~~05a~~ 07	Specification for Steel Wire, Plain, for Concrete Reinforcement	IRC							
A106/A 106M-~~08~~ 11	Specification for Seamless Carbon Steel Pipe for High-Temperature Service	IMC	IRC	IFGC					
A123/A 123M-~~02~~ 12	Specification of Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products	IBC							
A126-~~04~~(2009)	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings	IMC	IRC						
A153/A153M-~~05~~ 09	Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware	IBC	IRC						
A182-~~10a~~ 12A	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service	ISPSC							
A185/A 185M-~~06E01~~ 07	Specification for Steel Welded Wire Reinforcement, Plain for Concrete	IBC							
A240/A 240M-~~09~~ 12	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications	IBC	IRC	IPSPC					
A252-~~98(2007)~~ 10	Specification for Welded and Seamless Steel Pipe Piles	IBC							
A283/A 283M-~~03(2007)~~ 12	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates	IBC							
A307-~~07b~~ 10	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength	IBC	IRC						
A312/A 312M-~~08a~~ 12A	Specification for Seamless, and Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes	IPC	IRC	ISPSC					

A377-~~03~~ 2003(2008)e1*	Index of Specification for Ductile-Iron Pressure Pipe	IRC							
A403-~~10a~~ 12	Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings	ISPSC							
A416/A 416M-~~06~~ 12A	Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete	IBC							
A420/A 420M-~~07~~ 10A	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service	IMC							
A421/A 421M- ~~05~~ 10	Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete	IBC							
A435/A 435M-90 ~~(2007)~~ 2012	Specification for Straight-Beam Ultrasonic Examination of Steel Plates	IBC							
A463M/A 463M-~~06~~ 10	Specification for Steel Sheet, Aluminum-Coated, by the Hot Dip Process	IBC	IRC						
A480/A480M-~~06b~~ 12	Specification for General Requirements for Flat-Rolled Stainless and Heat-/Resisting Steel Plate, Sheet and Strip	IBC							
A496-~~05~~ 07	Specification for Steel Wire, Deformed for Concrete Reinforcement	IBC							
A497 A497M-~~06e01~~ 07	Specification for Steel Welded Reinforcement Deformed for Concrete	IBC							
A510-~~08~~ 11	Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, Alloy Steel	IBC	IRC						
A572/A 572M-~~07~~ 12	Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel	IBC							
A588/A 588M-05 ~~10~~	Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point, with Atmospheric Corrosion Resistance	IBC							
A615/A 615M-~~09~~ 12	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement	IBC	IRC						
A653/A 653M-~~08~~ 11	Specification for Steel Sheet, Zinc-Coated Galvanized or Zinc-Iron Alloy-Coated Galvannealed by the Hot-Dip Process	IBC	IRC						
A690/690M-07(2012)	Standard Specification for High Strength Low-Alloy Nickel, Copper Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments	IBC							
A706/A 706M-09B	Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement	IBC	IRC						
A722/A 722M-~~07~~ 12	Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete	IBC							
A733-2003(2009)e1*	Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples	IPC							
A755/A 755M-~~03(2008)~~ 2011	Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC	IRC						

A767/A 767M-~~05~~ 09	Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement	IBC							
A775/A 775M-07b	Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC							
A778-01(2009)e1	Specification for Welded Unannealed Austenitic Stainless Steel Tubular Products	IPC	IRC						
A792/A 792M-~~08~~ 10	Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process	IBC	IRC						
A875/A 875M-~~06~~ 10	Standard Specification for Steel Sheet Zinc-5%, Aluminum Alloy-Coated by the Hot-Dip Process	IBC	IRC						
A888-~~09~~ 11	Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Application	IPC	IPSDC	IRC					
A913/A 913M-~~07~~ 11	Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST)	IBC							
A924/A 924M-~~08a~~ 2010a	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process	IBC	IRC						
A951/A951M-~~06~~ 11	Specification for Steel Wire Masonry Joint Reinforcement	IRC							
A992/A 992M-~~06a~~ 11	Standard Specification for Structural Shapes	IBC							
A996/A 996M-20**09**b	Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement	IRC							
A1003/A 1003M-~~08~~ 12	Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-formed Framing Members	IRC							
A1008/A1008M-~~07~~ 12	Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable	IBC							
B42-~~02e01~~ 10	Specification for Seamless Copper Pipe, Standard Sizes	IPC	IBC	IRC	IFC				
B43-~~98(2004)~~ 09	Specification for Seamless Red Brass Pipe, Standard Sizes	IPC	IBC	IRC	IFC	IMC			
B68-~~02~~ 11	Specification for Seamless Copper Tube, Bright Annealed	IBC	IFC	IMC					
B75-~~02~~ 11	Specification for Seamless Copper Tube	IPC	IPSDC	IRC	IMC				
B88-~~03~~ 09	Specification for Seamless Copper Water Tube	IPC	IBC	IPSDC	IRC	IMC	IFC	IPSPC	
B101-~~07~~ 12	Specification for Lead-Coated Copper Sheet and Strip for Building Construction	IBC	IRC						
B135-~~08a~~ 10	Specification for Seamless Brass Tube	IRC	IMC						
B152/B 152M-~~06a~~ 09	Specification for Copper Sheet, Strip Plate and Rolled Bar	IPC							
B209-~~07~~ 10	Specification for Aluminum and Aluminum-Alloy Steel and Plate	IBC	IRC						
B210-~~04~~ 12	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes	IFGC							

B227-~~04~~ 10	Specification for Hard-Drawn Copper-Clad Steel Wire	IRC							
B241/B 241M-~~02~~ 10	Specification for Aluminum and Aluminum-Alloy, Seamless Pipe and Seamless Extruded Tube	IFGC							
B251-~~02e01~~ 10	Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	IPC	IPSDC	IBC	IFC	IRC	IM C		
B302-~~07~~ 12	Specification for Threadless Copper Pipe, Standard Sizes	IPC	IRC	IMC					
B370-~~09~~ 12	Specification for ~~Cold Rolled~~ Copper Sheet and Strip for Building Construction	IBC	IRC						
B447-~~07~~ 12a	Specification for Welded Copper Tube	IPC	IRC						
B633-~~07~~ 11	Specification for Electodeposited Coatings of Zinc on Iron and Steel	IRC							
B687-99~~(2005)e01~~ (2011)	Specification for Brass, Copper, and Chromium-Plated Pipe Nipples	IPC							
B695-04(2009)	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel	IBC	IRC						
B813-~~00(2009)~~ 10	Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube	IPC	IPSDC	IRC	IMC				
B828-02(2010)	Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings	IPC	IPSDC	IRC					
C4-04~~e01~~ (2009)	Specification for Clay Drain Tile and Perforated Clay Drain Tile	IPC	IPSDC	IRC					
C5-~~03~~ 10	Specification for Quicklime for Structural Purposes	IBC	IRC						
C14-~~07~~ 11	Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe	IPC	IPSDC	IRC					
C22/C 22M-00~~(2005)e01~~ (2010)	Specification for Gypsum	IBC	IRC						
C27-98(2008)	Specification for ~~Standard~~ Classification of Fireclay and High-Alumina Refractory Brick	IBC	IRC						
C28/C 28M-~~00(2005~~**)** 10	Specification for Gypsum Plasters	IBC	IRC						
C31/C 31M-~~08b~~ 12	Practice for Making and Curing Concrete Test Specimens in the Field	IBC							
C33/C33M-~~08~~ 11a	Specification for Concrete Aggregates	IBC	IRC						
C34~~–03~~ 10	Specification for Structural Clay Load-Bearing Wall Tile	IBC	IRC						
C35-~~01(2005)~~/C35M-1995(2009)	Specification for Inorganic Aggregates for Use in Gypsum Plaster	IBC	IRC						
~~C36/C 36M-03~~ Withdrawn Replaced	Specification for Gypsum Wallboard	IBC							
~~C37/C 37M-01~~ Withdrawn Replaced	Specification for Gypsum Lath	IBC							
C42/C 42M-~~04~~ 12	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	IBC							
C55-~~06e01~~ 2011	Specification for Concrete Building Brick	IBC	IRC						
C56-~~05~~ 2010	Specification for Structural Clay Non-Load-Bearing Tile	IBC							
C59/C 59M-**00(2006)**	Specification for Gypsum Casting Plaster and Molding Plaster	IBC	IRC						

C61/C 61M-00(2006) (2011)	Specification for Gypsum Keene's Cement	~~IBC~~	IRC						
C62-~~08~~ 12	Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)	IBC	IRC						
C67-~~08~~ 12	Test Methods of Sampling and Testing Brick and Structural Clay Tile	IBC							
C73-~~05~~ 10	Specification for Calcium Silicate ~~Face~~ Brick (Sand-Lime Brick)	IBC	IRC						
C76-~~08a~~ 12a	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe	IPC	IPSDC	IRC					
C90-~~08~~ 12	Specification for Loadbearing Concrete Masonry Units	IBC	IRC	IECC					
C91-~~05~~ 12	Specification for Masonry Cement	IBC	IRC						
C94/C 94M-~~09~~ 12	Specification for Ready-Mixed Concrete	IBC	IRC						
C109/C 109M-~~05~~ 2001b	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)	IBC							
C126-~~99(2005)~~ 12	Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	IBC							
C129-~~06~~ 11	Specification for Nonload-bearing Concrete Masonry Units	IBC	IRC						
C140-~~08a~~ 2012a	Test Method Sampling and Testing Concrete Masonry Units and Related Units	IBC	IRC						
C143/C 143M-~~08~~ 2010a	Test Method for Slump of Hydraulic Cement Concrete	IRC							
~~C145-85~~ *Withdrawn Combined*	Specification for Solid-Load Bearing Concrete Masonry Units	IRC							
C150-~~07~~ 12	Specification for Portland Cement	IBC	IRC						
C172/C172M-~~08~~ 10	Practice for Sampling Freshly Mixed Concrete	IBC							
C199-84 ~~(2005)~~ (2011)	Test Method for Pier Test for Refractory Mortars	IBC	IRC						
C203-~~5a~~ (2012)	Standard Test Methods for Breaking Load and Flexural Properties of Block-type Thermal Insulation	IRC							
C206-03(2009)	Specification for Finishing Hydrated Lime	IBC							
C207-~~06~~ 2011	Specification for Hydrated Lime for Masonry Purposes	IBC	IRC						
C208-~~2008a~~ 12	Specification for Cellulosic Fiber Insulating Board	IBC	IRC						
C212-~~00(2006)~~10	Specification for Structural Clay Facing Tile	IBC							
C216-~~07a~~ 12	Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)	IBC	IRC						
C270-~~08a~~ 12a	Specification for Mortar for Unit Masonry	IBC	IRC						
C272-~~01(2007)~~/C272M-12	Standard Test Method for Water Absorption of Core Materials for ~~Structural~~ Sandwich Constructions	IRC							
C273/C273M-~~07a~~ 11	Standard Test Method for Shear Properties of Sandwich Core Materials	IRC							

C296-~~00(2004)~~ /C296M-00(2009)e1	Specification for Asbestos-Cement Pressure Pipe	IPC	IRC						
C315-07(2011)	Specification for Clay Flue Liners and Chimney Pots	IBC	IRC	IMC	IFGC				
C317/C 317M-00~~(2005)~~ 2010	Specification for Gypsum Concrete	IBC							
C330-**~~05~~/C330-2009**	Specification for Lightweight Aggregates for Structural Concrete	IBC							
C331-~~05~~ /C331M-2010	Specification for Lightweight Aggregates for Concrete Masonry Units	IBC							
C406-~~06e01~~ /C406M-2010	Specification for Roofing Slate	IBC	IRC						
C411-~~05~~ 11	Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation	IRC	IMC						
C425-04(2009)	Specification for Compression Joints for Vitrified Clay Pipe and Fittings	IPC	IPSDC	IRC					
C428/C428M-05(20~~06~~11)e1	Specification for Asbestos-Cement Nonpressure Sewer Pipe	IPC	IPSDC	IRC					
C443-~~05a~~ 12	Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets	IPC	IPSDC	IRC					
C472-99~~(2004)~~ (2009)	Specification for Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete	IBC							
C473-~~07~~ 12	Test Methods for Physical Testing of Gypsum Panel Products	IBC							
C474-~~05~~ 12	Test Methods for Joint Treatment Materials for Gypsum Board Construction	IBC							
C475/C 475M-~~02(2007)~~ 12	Specification for Joint Compound and Joint Tape for Finishing Gypsum ~~Wall~~ Board	IBC	IRC						
C476-~~08~~ 10	Specification for Grout for Masonry	IRC							
C496/C496M-~~96~~ 11	Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens	IEBC							
C503-~~08a~~ 10	Specification for Marble Dimension Stone (Exterior)	IBC							
C508/C508M-00~~(2004)~~ (2009)e1	Specification for Asbestos-Cement Underdrain Pipe	IPC	IRC						
C514-04(2009)e1	Specification for Nails for the Application of Gypsum Board	IBC	IRC						
C516-08~~a~~	Specification for Vermiculite Loose Fill Thermal Insulation	IBC							
C518-~~04~~ 10	Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus	IBC	IECC						
C547-~~07e1~~ 12	Specification for Mineral Fiber Pipe Insulation	IBC							
C549-06(2012)	Specification for Perlite Loose Fill Insulation	IBC							
C552-~~07~~ 12b	Standard Specification for Cellular Glass Thermal Insulation	IBC	IRC						
C557-03(2009)e~~0~~1	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC	IRC						
C564-~~08~~ 12	Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings	IPC	IPSDC	IRC					

C568-~~08a~~ 10	Specification for Limestone Dimension Stone	IBC							
C578~~—08b~~12a	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation	IBC	IRC						
C587-04~~(2009)~~	Specification for Gypsum Veneer Plaster	IBC	IRC						
C595/C95M-~~08a~~ 2012e1	Specification for Blended Hydraulic Cements	IBC	IRC						
C615/C615M-~~03~~ 2011	Specification for Granite Dimension Stone	IBC							
C616/C616M-~~08a~~ 2010	Specification for Quartz Dimension Stone	IBC							
C629-~~08~~ 2010	Specification for Slate Dimension Stone	IBC							
~~C630/C 630M-03~~ *Withdrawn replaced by C1396/C1396M-11*	Specification for Water-Resistant Gypsum Backing Board	IBC	IRC						
C635/C635M-~~07~~ 12	Specification for the Manufacturer, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings	IBC							
C645-~~08a~~ 11A	Specification for Nonstructural Steel Framing Members	IBC	IRC						
C652-~~09~~ 12	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)	IBC	IRC						
C685/C 685M-~~07~~ 11	Specification for Concrete Made by Volumetric Batching and Continuous Mixing	IRC							
C700-~~07a~~ 11	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated	IPC	IPSDC	IRC					
C726-~~05e1~~ 12	Standard Specification for Mineral Wool Roof Insulation Board	IBC							
C728-05(2010)	Standard Specification for Perlite Thermal Insulation Board	IBC	IRC						
C744-~~08~~ 11	Specification for Prefaced Concrete and Calcium Silicate Masonry Units	IBC							
C754-~~08~~ 11	Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products	IBC							
C836/C836M-~~06~~ 12	Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course	IBC	IRC						
C840-~~08~~ 11	Specification for Application and Finishing of Gypsum Board	IBC							
C841-03(2008)E1	Specification for Installation of Interior Lathing and Furring	IBC							
C842-~~05~~(2010)E1	Specification for Application of Interior Gypsum Plaster	IBC							
C843-99~~(2006)~~ (2012)	Specification for Application of Gypsum Veneer Plaster	IBC	IRC						
C844-04(2010)	Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster	IBC	IRC						
C847-~~09~~ 12	Specification for Metal Lath	IBC	IRC						
C887-05(2010)	Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar	IBC	IRC						

C897-05(2009)	Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters	IBC	IRC							
C920-~~08~~ 11	Standard Specification for Elastomeric Joint Sealants	IBC	IRC	IgCC						
C926-~~06~~ 12A	Specification for Application of Portland Cement-Based Plaster	IBC	IRC							
C931/C 931M-04 *Withdrawn Replaced by C1396/C1396M-11*	Specification for Exterior Gypsum Soffit Board	IBC								
C932-06	Specification for Surface-Applied Bonding Compounds ~~Agents~~ for Exterior Plastering	IBC								
C933-~~07b~~ 11	Specification for Welded Wire Lath	IBC								
C946-~~91 (2001)~~ 10	Specification for ~~Practice for~~ Construction of Dry-stacked, Surface-Bonded Walls	IBC								
C954-~~07~~ 11	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch (0.84 mm) to 0.112 inch (2.84 mm) in Thickness	IBC	IRC							
C955-~~09~~ 11C	Standard Specification for Load-bearing Transverse and Axial Steel Studs, Runners Tracks, and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases	IBC	IRC							
C956-04(2010)	Specification for Installation of Cast-in-Place Reinforced Gypsum Concrete	IBC								
C957-~~06~~ 10	Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface	IBC	IRC							
C989/C989M-~~06~~ 12A	Specification for ~~Ground Granulated Blast-Furnace~~ Slag Cement for Use in Concrete and Mortars	IBC								
C1007-~~08a~~ 11a	Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories	IBC								
C1019-~~09~~ 11	Test Method for Sampling and Testing Grout	IBC								
C1029-~~08~~ 10	Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation	IBC	IRC							
C1032-06(2011)	Specification for Woven Wire Plaster Base	IBC	IRC							
C1047-~~09~~ 10A	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base	IBC	IRC							
C1053-00~~(2005)~~ (2010)	Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications	IPC								

C1063-~~08~~ 12C	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster	IBC	IRC							
C1088-09	Specification for Thin Veneer Brick Units Made From Clay or Shale	IBC								
C1072-~~06~~ 11	Standard Text Method for Measurement of Masonry Flexural Bond Strength	IBC								
C1107/C1107-~~08~~ 11	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)	IRC								
C1116/C1116M-~~08a~~ 10	Standard Specification for Fiber - Reinforced Concrete and Shotcrete	IRC								
C1157-~~08a~~ 11	Standard Performance Specification for Hydraulic Cement	IBC								
C1167-~~03~~ 11	Specification for Clay Roof Tiles	IBC	IRC							
C1173-~~08~~ 10	Specification for Flexible Transition Couplings for Underground Piping Systems	IPC	IPSDC	IRC						
C1178/C 1178M-~~06~~ 11	Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel	IBC	IRC							
C1186-08	Specification for Flat ~~Nonasbestos~~ Fiber Cement Sheets	IBC	IRC							
C1218/C1218M-99(2008)	Test Method for Water-Soluble Chloride in Mortar and Concrete	IBC								
C1240-~~05~~ 12	Specification for Silica Fume Used in Cementitious Mixtures	IBC								
C1261-~~07~~ 10	Specification for Firebox Brick for Residential Fireplaces	IBC	IRC							
C1277-~~08~~ 11	Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	IPC	IPSDC	IRC						
C1278/C1278M-07a(2011)	Specification for Fiber-Reinforced Gypsum Panels	IBC	IRC							
C1280-~~09~~ 12A	Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing	IBC								
C1283-~~07a~~ 11	Practice for Installing Clay Flue Lining	IBC	IRC							
C1288-99~~(2004)e1~~ 2010	Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets	IBC	IRC							
C1289~~—08~~ 12a	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board	IBC	IRC							
C1314-~~07~~ 11A	Test Method for Compressive Strength of Masonry Prisms	IBC								

C1325-08b	Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement ~~Interior Substrate Sheets~~ Backer Units	IBC	IRC						
C1328/C1328M-~~05~~ 12	Specification for Plastic (Stucco Cement)	IBC	IRC						
C1364-~~07~~ 10B	Standard Specification for Architectural Cast Stone	IBC							
C1371-04A(2010)E1	Standard Test Method For Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers	IECC	IgCC						
C1373/C1373-~~-03~~ 11	Standard Practice for Determination of Thermal Resistance of Attic Insulation Systems Under Simulated Winter Conditions	IECC							
C1396/1396M-~~06a~~ 11	Specification for Gypsum Ceiling Board	IBC	IRC						
C1405-~~08~~ 12	Standard Specification for Glazed Brick (Single Fired, Solid Brick Units)	IBC							
C1492-03(2009)	Standard Specification for Concrete Roof Tile	IBC	IRC						
C1513-~~04~~ 12	Standard Specification for Concrete Roof Tile	IRC							
C1540-~~08~~ 11	Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	IPC							
C1611/C 1611M-~~05~~ 09BE1	Standard Test Method for Slump Flow of Self-Consolidating Concrete	IBC							
C1629/C1692M—06(2011)	Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels	IBC							
C1658/C1658-~~06~~ 12	Standard Specification for Glass Mat Gypsum Panels	IBC	IRC						
C1563-08	Standard Test Method for Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent and Storm Piping Applications	IPC							
D25-~~99(2005)~~12	Specification for Round Timber Piles	IBC							
D56-05(2010)	Test Method for Flash Point by Tag Closed Tester	IBC							
D86-~~09~~ 2011b	Test Method for Distillation of Petroleum Products at Atmospheric Pressure	IBC	IFC						
D92-~~05a~~ 12	Test Method for Flash and Fire Points by Cleveland Open Cup Tester	IFC							
D93-~~08~~ 11	Test Method for Flash Point by Pensky-Martens Closed Cup Tester	IBC	IFC	IMC					

D226/D226M-~~06~~ 09	Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing	IBC	IRC						
D227/D227M-03(2011)E1	Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing	IBC	IRC						
D635-~~06~~ 10	Test Method for Rate of Burning and/or Extent and Time of Burning of ~~Self-Supporting~~ Plastics in a Horizontal Position	IBC							
D1003-~~07~~ 11e1	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics	IECC							
D1248-~~05~~ 12	Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable	IRC							
D1557-~~07~~ 12	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3(2,700kN-m/m3))	IBC							
D1593-09	Non-rigid vinyl chloride plastic film and sheeting	ISPSC							
D1621-~~04a~~ 10	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics	IRC							
D1623-~~03~~ 09	Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics	IRC							
D1693-~~08~~ 12	Test Method for Environmental Stress-Cracking of Ethylene Plastics	IRC	IMC						
D1784-~~08~~ 11	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Choloride) (CPVC) Compounds	IRC							
D1785-~~06~~ 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120	IPC	IMC	IRC	ISPSC				
D1863/D1863M-05(2011)E1	Specification for Mineral Aggregate Used on Built-Up Roofs	IBC	IRC						
D1869-95 ~~(2005)e1~~ (2010)	Specification for Rubber Rings for Asbestos-Cement Pipe	IPC	IPSDC	IRC					
D1929-~~96(2001)e01~~ 12	Test Method for Determining Ignition ~~Properties~~ Temperature of Plastics	IBC							
D1970/D1970M-~~09~~ 11	Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection	IBC	IRC						
D2126-~~04~~ 09	Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging	IRC							
D2216-~~05~~ 10	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	IBC							
D2235-04 (2011)	Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings	IPC	IPSDC	IMC	IRC				
D2239-~~03~~ 12	Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter	IPC	IRC						

D2241-~~05~~ 09	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series)	IPC	IRC	IMC	ISPSC				
D2412-~~02(2008)~~ 11	Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading	IRC	IMC						
D2487-~~06e1~~ 2011	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	IBC							
D2513-~~08b~~ 12	Specification for ~~Thermoplastic~~ Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings	IRC	IMC	IFGC					
D2559-~~04~~ 12A	Standard Specification for Adhesives for ~~Structural Laminated~~ Bonded Structural Wood Products for Use under Exterior (West Use) Exposure Conditions	IRC							
D2564-~~04e01~~ 12	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems	IPC	IPSDC	IRC	IMC				
D2626/D2626M-04(2012)E1	Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing	IBC	IRC						
D2661-~~08~~ 11	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC					
D2665-~~09~~ 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC					
D2672-96a~~(2003)~~ (2009)	Specification for Joints for IPS PVC Pipe Using Solvent Cement	IPC	IRC	ISPSC					
D2683-~~04~~ 10	Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing	IPC	IRC	IMC					
D2729-~~03~~ 11	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings	IRC	IPC	IPSDC					
D2737-~~03~~ 12E1	Specification for Polyethylene (PE) Plastic Tubing	IPC	IRC						
D2822/D2822M-05(2011)E1	Specification for Asphalt Roof Cement, Asbestos Containing	IBC	IRC						
D2823/D2823M-05 (2011)E1	Specification for Asphalt Roof Coatings, Asbestos Containing	IBC	IRC						
D2824-06(2012)E1	Specification for Aluminum-Pigmented Asphalt Roof Coatings, Non-fibered, Asbestos Fibered, and Fibered without Asbestos	IRC	IBC						
D2837-~~08~~ 11	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products	IRC	IMC						
D2843-~~99(2004)e01~~ 10	Test for Density of Smoke from the Burning or Decomposition of Plastics	IBC							
D2846/D 2846M-09BE1	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems	IPC	IRC	IMC	ISPSC				
D2855-96~~(2002)~~ (2010)	Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings	IPC	IPSDC	IRC					
D2859-06 (2011)	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials	IBC	IFC						
D2898-~~(04)~~ 10	Standard Test Methods for Accelerated Weathering of Fire-	IBC	IRC	IWUIC					

	Retardant-Treated Wood for Fire Testing									
D2949-~~01a(2008)~~ 10	Specification for 3.25-in. Outside Diameter Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC						
D2974-07~~a~~ A	Standard Test Methods for Moisture, Ash and Organic Matter of Peat and other Organic Soils	IgCC								
D3035-~~08~~ 12	Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter	IPC	IRC	IMC						
D3139-98~~(2005)~~ 2011	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	IPC								
D3161/D3161M-~~09~~ 12	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)	IBC	IRC							
D3200-74~~(2005)~~ 2012	Standard Specification and Test Method for Establishing Recommended Design Stresses for Round Timber Construction Poles	IBC								
D3201-08AE1	Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products	IBC	IRC	IWUIC						
D3261-~~03~~ 12	Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings Plastic Pipe and Tubings	IMC	IPC							
D3278-1996~~(2004)e1~~ (2011)	Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus	IBC	IFC	IMC						
D3311-~~08~~ 11	Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns	IPC	IRC							
D3350-~~08~~ 12	Specification for Polyethylene Plastics Pipe and Fittings Materials	IRC	IMC							
D3462/3462M-~~09~~ 10A	Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules	IBC	IRC							
D3679-~~09~~ 11	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding	IBC	IRC							
D3689-07	Test Methods for Deep Foundations ~~Piles~~ Under Static Axial Tensile Load	IBC								
D3737-~~08~~ 09E1	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)	IBC	IRC							
D3805/D3805M-97~~(2003)e1~~ (2009)	Standard Guide for Application of Aluminum-Pigmented Asphalt Roof Coatings	IBC								
D3909/D3909M-97b~~(2004)~~ 2012e1	Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules	IBC	IRC	IWUIC						
D3957-~~06~~ 09	Standard Practices for Establishing Stress Grades for Structural Members Used In Log Buildings	IBC	IRC							
D4022/D4022M-2007(2012)E1	Specification for Coal Tar Roof Cement, Asbestos Containing	IBC	IRC							
D4068-~~01~~ 09	Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane	IPC	IRC							
D4272-~~08a~~ 09	Test Method for Total Energy Impact of Plastic Films by Dart Drop	IBC								
D4318-~~05~~ 10	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	IBC	IRC							
D4434/D4434M-~~09~~ 12	Specification for Poly (Vinyl Chloride) Sheet Roofing	IBC	IRC							

D4479/D4479M-07(2012)E1	Specification for Asphalt Roof Coatings - Asbestos-Free	IBC	IRC							
D4551-~~96 (2008)e1~~ 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane	IPC	IRC							
D4586/D4586M-07(2012)E1	Specification for Asphalt Roof Cement, Asbestos-Free	IBC	IRC							
D4601/D4601M-~~08~~ 042012E1	Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing	IBC	IRC							
D4637/D4637M-~~08~~ 12	Specification for EPDM Sheet Used in Single-Ply Roof Membrane	IBC	IRC							
D4829-~~08a~~ 11	Test Method for Expansion Index of Soils	IBC	IRC							
D4869/D4869M-05(2011)e01	Specification for Asphalt-Saturated (Organic Felt) Underlayment Used in Steep Slope Roofing	IBC	IRC							
D4897/D4897M-01(2009)	Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing	IBC	IRC							
D4945-~~08~~ 12	Test Methods for High-Strain Dynamic Testing of Deep Foundations	IBC								
~~D5019-07a~~ Withdrawn/no replacement	Specification for Reinforced CSM Polymeric Sheet Used in Roofing Membrane	IBC	IRC							
D5055-~~10~~ 12	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists	IBC	IRC	IgCC						
D5197-09E1	Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)	IgCC								
D5456-~~10~~ 12	Standard Specification for Evaluation of Structural Composite Lumber Products	IBC	IRC	IgCC						
D5516-~~03~~ 09	Test Method of Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to the Elevated Temperatures	IBC	IRC							
D5643/D5643M-06 (2012)E1	Specification for Coal Tar Roof Cement, Asbestos-Free	IBC	IRC							
D5664-~~08~~ 10	Test Methods for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber	IBC	IRC							
D6162-2000a(2008)	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC	IRC							
D6164/D6164M-~~05e1~~ 11	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC	IRC							
D6222/D6222M-~~08~~ 11	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC	IRC							
D6223D6223M-02(2009)E1	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC	IRC							

D6662-09	Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards	IWUIC							
D6694-08	Standard Specification for Liquid-applied Silicone Coating Used In Spray Polyurethane Foam Roofing Systems	IBC	IRC						
D6698-~~07~~ 12	Standard Test Method for On-Line Measurement of Turbidity Below 5 NTU in Water	IgCC							
D6754/D6745M-~~02~~ 10	Standard Specification for Ketone Ethylene Ester Based Sheet Roofing	IBC	IRC						
D6757-07	Standard Specification for ~~Inorganic~~ Underlayment Felt Containing Inorganic Fibers used in Steep-Slope Roofing ~~Products~~	IBC	IRC						
D6878-~~08e1~~/D6878-11A	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing	IBC	IRC						
D6886-~~11~~ 12	Standard Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis	IgCC							
D7032-~~08~~ 10a	Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)	IRC	IWUIC						
D7158-08~~d~~ /D7158M 2011	Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)	IBC	IRC						
E84-~~09~~ 2012c	Test Method for Surface Burning Characteristics of Building Materials	IBC	IFC	IRC	IMC				
E96/E96M-~~05~~ 10	Test Method for Water Vapor Transmission of Materials	IBC	IRC						
E108-~~07a~~ 2011	Test Methods for Fire Tests of Roof Coverings	IBC	IRC						
E119-~~2008a~~ 2012a	Standard Test Methods for Fire Tests of Building Construction and Materials	IBC	IRC	IMC	IWUIC				
E136-~~09~~ 2012	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C	IBC	IRC	IMC	IWUIC				
E519-~~00e1~~ /E519M 2010	Standard Test Method for Diagonal Tension (Shear) in Masonry Assemblages	IEBC							
E605-93(~~2006~~) (2011)	Test Method for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members	IBC							
E681-~~04~~ 2009	Test Method for Concentration Limits of Flammability of Chemicals (Vapors and Gases)	IBC	IFC						
E736-00~~(2006)~~ (2011)	Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members	IBC							
E779-~~—03~~ 10	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	IECC	IgCC						
E814-~~08b~~ 2011a	Test Method of Fire Tests of Through-Penetration Firestops	IBC	IRC	IMC					
E970-~~08a~~ 2010	Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source	IBC	IRC						
E1300-~~07e01~~ 12AE1	Practice for Determining Load Resistance of Glass in	IBC							

	Buildings								
E1332-90(2003)	Standard Classification for the Determination of Outdoor-Indoor Transmission Class	IgCC							
E1354-~~09~~ 2011b	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter	IBC	IFC						
E1465-08A	Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings	IRC							
E1509-~~04~~ 12	Standard Specification for Room Heaters, Pellet Fuel-Burning Type	IRC	IMC	IgCC					
E1529-~~06~~ 10	Test Method for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies	IFC							
E1537-~~07~~ 12	Test Method for Fire Testing of Upholstered Furniture	IFC							
E1590-~~07~~ 12	Test Method for Fire Testing of Mattresses	IFC							
E1592-05(2012)	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference	IBC							
E1602-~~03~~ 02(2010)E1	Guide for Construction of Solid Fuel-Burning Masonry Heaters	IBC	IRC						
E1643-~~10~~ 11	Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slabs	IgCC							
E1677-~~05~~ 11	Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls	IECC							
E1966-07A(2011)	Test Method for Fire resistant Joint Systems	IBC	IFC						
E1980-~~01~~ 11	Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces	IECC	IgCC						
E1996-~~09~~ 12	Specification for Performance of Exterior Windows, ~~Glazed~~ Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes	IBC	IRC	IFC					
E2072-~~04~~ 10	Standard Specification for Photolumiscent (Phosphorescent) Safety Markings	IBC	IFC						
E2174-~~09~~ 10AE1	Standard Practice for On-Site Inspection of Installed Fire Stops	IBC	IEBC						
E2178~~-03~~ 11	Standard Test Method for Air Permeance of Building Materials	IRC	IECC						
E2231-~~04~~ 09	Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess to Surface Burning Characteristics	IRC	IMC						
E2273-03(2011)	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies	IBC	IRC						

E2307 -~~04~~ 12	Standard Test Method for Determining Fire Resistance of a Perimeter ~~Fire Barriers~~ Joint System Between an Exterior Wall Assembly and a Floor Assembly Using the Intermediate-Scale, Multi-story Test Apparatus[1].	IBC							
E2336-04(2009)	Standard Test Methods Fire Resistive Grease Duct Enclosure Systems	IMC							
E2357-~~05~~ 11	Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies	IECC							
E2393-~~09~~ 10A	Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barrier	IBC	IEBC						
E2404~~—08~~ 12	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics	IBC	IFC						
E2568—09e1	Standard Specification of PB Exterior Insulation and Finish Systems ~~(EIFS)~~	IBC	IRC						
E2573~~—07a~~ 12	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics	IBC	IFC						
E2599-~~09~~ 11	Standard Practice for Specimen Preparation and Mounting of Reflective Insulation Materials and Vinyl Stretch Ceiling Materials ~~Radiant Barrier~~ for Building Applications to Assess Surface Burning Characteristics	IBC							
E2634-~~08~~ 11	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems	IBC	IRC						
F409-~~02(2008)~~ 12	Specification for Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings	IPC	IRC						
F437-~~06~~ 09	Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	IPC	IRC	IMC	ISPSC				
F438-~~04~~ 09	Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40	IPC	IRC	IMC	ISPSC				
F439-~~06~~ 12	Specification for ~~Socket-Type~~ Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	IPC	IRC	IMC	ISPSC				
F441/F 441M-~~02(2008)~~ 12	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80	IPC	IRC	IMC					
F442/F 442M-~~99(2005)e1~~ 12	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)	IPC	IRC	IMC					
F477-~~08~~ 10	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe	IPC	IPSDC	IRC					
F493-~~04~~ 10	Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings	IPC	IRC	IMC					
F547-~~06~~ (2012)	Terminology of Nails for Use with Wood and Wood-based Materials	IBC							

F656-~~08~~ 10	Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings	IPC	IPSDC	IRC					
F714-~~08~~ 12E1	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter	IPC	IRC	IMC					
F876-~~08b~~ 10E1	Specification for Crosslinked Polyethylene (PEX) Tubing	IPC	IRC	IMC					
F877-~~07~~ 11	Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems	IPC	IRC	IMC					
F891-~~07~~ 10	Specification for Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core	IPC	IPSDC	IRC					
F1055-~~98(2006)~~ 11	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene Pipe and Tubing	IPC	IRC	IMC					
F1281-~~07~~ 11	Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe	IPC	IRC	IMC					
F1282-~~06~~ 10	Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe	IPC	IMC	IRC					
F1346-91 ~~(2003)~~ (2010	Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs	IBC	IRC	IPMC	IgCC	ISPSC			
F1484-~~05~~ 12	Standard Test Methods for Performance of Steam Cookers	IgCC							
F1488-~~03~~ 09E1	Specification for Coextruded Composite Pipe	IPC	IPSDC	IRC	IgCC				
F1496-~~99(2005)e1~~ 12	Standard Test Method for Performance of Convection Ovens	IgCC							
F1499-~~01(2008)~~ 12	Specification for Coextruded Composite Drain, Waste, and Vent Pipe (DWV)	IPSDC							
F1667-05 11A E1	Specification for Driven Fasteners: Nails, Spikes, and Staples	IBC	IRC						
F1673-~~04(2005)~~ 10	Standard Specification for Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems	IPC							
F1807-~~08~~ 12	Specifications for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	IPC	IRC	IMC					

F1924-~~05~~ 12	Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing	IMC							
F1960-~~09~~ 12	Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing	IPC	IRC	IMC					
F1974-~~08~~ 09	Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe	IPC	IRC	IMC					
F1986-01~~(2006~~) (2011)	Specification for Multilayer Pipe, Type 2, Compression Fittings and Compression Joints for Hot and Cold Drinking Water Systems	IPC	IRC						
F2080-~~08~~ 09	Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-linked Polyethylene (PEX) Pipe	IPC	IRC						
F2098-08	Standard Specification for Stainless Steel Clamps for Securing SDR9 Cross-Linked Polyethylene (PEX) Tubing to Metal Insert and Plastic Insert Fittings	IPC	IRC						
F2159-~~05~~ 11	Specification for Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	IPC							
F2200~~—05~~ 11B	Standard Specification for Automated Vehicular Gate Construction	IRC	IFC						
F2262-~~05~~ 09	Standard Specification for Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene Tubing OD Controlled SDR9	IPC	IRC						
F2306/F 2306M-~~08~~ 11	Specification for 12" to 60" 300 to 1500 mm annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications	IPC							
F2387-04(2012)	Standard Specification for Manufactured Safety Vacuum Release Systems, Swimming (SVRS) for Pools, Spas and Hot Tubs	IBC							
F2389-~~07e1~~ 10	Specification for Pressure-Rated Polypropylene (PP) Piping Systems	IPC	IRC	IMC					
F2434-~~08~~ 09	Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp ring for SDR9 Cross-Linked Polyethylene (PEX) Tubing and SDR9 Cross-Linked Polyethylene/Aluminum/Cross-Linked Polyethylene (PEX-AL-PEX) Tubing	IPC	IRC	IMC					
F2735-09	Standard Specification for Plastic Insert Fittings for SDR9 Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing	IMC	IPC	IRC					
F2769-~~09~~ 10	Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems	IMC	IPC	IRC					

AWCI	The Association of the Wall & Ceiling Industries International								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
12-B-~~98~~ 04	~~Technical Manual 12-B~~ Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide, ~~First~~ Second Edition	IBC							

AWPA	American Wood Protection Association								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
M4-~~08~~ 11	Standard for the Care of Preservative-Treated Wood Products	IBC	IRC						
U1-~~11~~ 14	USE CATEGORY SYSTEM: User Specification for Treated Wood except Section 6, Commodity Specification H	IBC	IRC						

AWS	American Welding Society								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
A5.8-~~04~~M/A5.8:2011	Specifications for Filler Metals for Brazing and Braze Welding	IRC	IMC	IPC					
D1.3-~~98~~/D1.3M:2008	Structural Welding Code-Sheet Steel	IBC							
D1.4-~~1998~~ /D1.4M:2011	Structural Welding Code - Reinforcing Steel Including Metal Inserts and Connections in Reinforced Concrete Construction	IBC							

AWWA	American Water Works Association								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
C104-~~98~~/A21.4-08	~~Standard for~~ Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water	IRC	IPC						
C110/A21.10-~~03~~ 12	~~Standard for~~ Ductile-Iron and Gray-Iron Fittings~~, 3 in through 48 Inches for Water~~	IRC	IPC	IMC					
C111-~~00~~/A21.11-12	~~Standard for~~ Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings	IPC	IFGC						
C115-A21.15-~~99~~ 11	~~Standard for~~ Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges	IRC	IPC	IMC					
C151/A21.51-~~02~~ 09	~~Standard for~~ Ductile-Iron Pipe, Centrifugally Cast for Water	IRC	IPC	IMC					
C153/A21.53-~~00~~ 11	~~Standard for~~ Ductile-Iron Compact Fittings for Water Service	IRC	IPC	IMC					
C510-~~00~~ 07	Double Check Valve Backflow Prevention Assembly	IRC	IPC						
C511-~~00~~ 07	Reduced-Pressure Principle Backflow Prevention Assembly	IRC	IPC						

C651-~~99~~ 05	Disinfecting Water Mains	IPC								
C652-~~02~~ 11	Disinfection of Water-Storage Facilities	IPC								
BHMA	**Builders Hardware Manufacturers' Association**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
A 156.19-~~2007~~ 2013	Power Assist and Low Energy Power Operated Doors	IBC	IFC							
CDPH	**California Department of Public Health**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
CDPH Section 01350	~~EHLB~~ Standard Method for the Testing and Evaluation of ~~VOC~~ Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1(2010)	IgCC								
CGA	**Compressed Gas Association**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
C-7 (~~2004~~) (2011)	Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers	IFC								
ANSI/CGA P-18-2006	Standard for Bulk Inert Gas Systems ~~at Consumer Sites (an American National Standard)~~	IFC								
P-20 (~~2003~~) (2009)	Standard for Classification of Toxic Mixtures	IFC								
P-23 (~~2003~~) (2008)	Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components	IFC								
S-1.1 (~~2005~~) (2011)	Pressure Relief Device Standards - Part 1 - Cylinders for Compressed Gases	IFC	IFGC							
S-1.3 (~~2005~~) (2008)	Pressure Relief Device Standards - Part 3 - Stationary Storage Containers for Compressed Gases	IFC	IFGC							
CPA	**Composite Panel Association**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
A135.4-~~2004~~ 2012	Basic Hardboard	IBC	IRC							
A135.5-~~2004~~ 2012	Prefinished Hardboard Paneling	IBC	IRC							
A135.6-~~2006~~ 2012	~~Hardboard~~ Engineered Wood Siding	IBC	IRC							
A208.1-~~99~~ 2009	Particleboard	IBC	IRC							
CRRC	**Cool Roof Rating Council**									
Standard Reference Number	**Title**	**Referenced in Code(s):**								
CRRC-1-20~~10~~ 12	Cool Roof Rating Council Standard	IgCC								

CSA	~~Canadian Standards Association~~ CSA Group								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ASME A17.1/CSA B44—2013	Safety Code for Elevators and Escalators	IBC	IFC	IEBC	IRC	IPMC			
ASME A112.18.1-~~2005~~ 2012/ CSA B125.1-~~2005~~ 2012	Plumbing Supply Fittings	IPC	IRC						
ASME A112.18.2-~~2005~~ 2011/ CSA B125.2-~~2005~~ 2011	Plumbing Waste Fittings	IRC	IPC						
ASME A112.19.1 2013/ CSA B45.2-~~08~~ 13	Enameled Cast-Iron and Enameled Steel Plumbing Fixtures	IRC	IPC						
A112.19.2-~~2008~~ 2013/ CSA B45.1-~~08~~ 13	Ceramic Plumbing Fixtures	IPC	IRC						
ASME A112.19.3-2008/ CSA B45.4-08(R2013)	Stainless-Steel Plumbing Fixtures	IRC	IPC						
ASME A112.19.5-2011/ CSA/B45.15-~~09~~ 11	Flush Valves and Spuds ~~Trim~~ for Water Closets, Urinals ~~Bowls~~ and Tanks	IPC	IRC						
ASME A112.19.7-2012/ CSA B45.10-~~09~~ 2012	Hydromassage Bathtubs ~~Appliances~~ Systems	IPC	IRC						
ASME A112.3.4-2013/CSA B45.9-~~99(R2008)~~ 13	Macerating Systems and Related Components	IRC	IPC						
ASSE 1016/ASME A112.1016/CSA B125.16-2011 is a replacement for ASSE 1016-2010	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC					
CSA B45.5-~~02 (R2008)~~ 11/ IAPMO Z124-2011	Plastic Plumbing Fixtures	IRC	IPC						
B64.1.1-~~01~~ 11	Vacuum Breakers, Atmospheric Type (AVB)	IRC	IPC						
B64.1.2-~~07~~ 11	Pressure Vacuum Breakers (PVB)	IRC	IPC						
B64.1.3-~~07~~ 11	Spill Resistant Pressure Vacuum Breakers (SRPVB)	IPC	IRC						
B64.2-~~01~~ 11	Vacuum Breakers, Hose Connection Type (HCVP)	IRC	IPC						
B64.2.1-~~07~~ 11	Vacuum Breakers, Hose Connection (HCVB) with Manual Draining Feature	IRC	IPC						
B64.2.1.1-~~07~~ 11	Hose Connection Dual Check Vacuum Breakers (HCDVB)	IRC	IPC						
B64.2.2-~~01~~ 11	Vacuum Breakers, Hose Connection Type (HCVP) with Automatic Draining Feature	IRC	IPC						
B64.3-~~07~~ 11	Dual Check Valve Backflow Preventers Atmospheric Port (DCAP)	IRC	IPC						
B64.4-~~07~~ 11	Reduced Pressure Principle Backflow Preventers (RP)	IRC	IPC						
B64.4.1-~~07~~ 11	Reduced Pressure Principle for Fire Systems (RPF)	IRC	IPC						
B64.5-~~07~~ 11	Double Check Backflow Preventers (DCVA)	IRC	IPC						
B64.5.1-~~07~~ 11	Double Check Valve Backflow Preventers for Fire Systems (DCVAF)	IRC	IPC						
B64.6-~~07~~ 11	Dual Backflow Preventers Check Valve (DuC)	IPC	IRC						
B64.7-~~07~~ 11	Laboratory Faucet Vacuum Breakers (LFVB)	IRC	IPC						
B64.10.1-~~07~~ 11	~~Manual for the Selection, Installation,~~ Maintenance and Field Testing of Backflow Preventers ~~ion Devices~~	IPC							

B79-08 <u>(R2013)</u>	Commercial and Residential Drains, and Cleanouts	IPC							
CSA B125.3-~~2005~~ <u>12</u>	Plumbing Fittings	IRC	IPC						
B137.1-~~05~~ <u>13</u>	Polyethylene (PE) Pipe , Tubing and Fittings for Cold Water Pressure Services	IRC	IPC						
B137.2-~~05~~ <u>13</u>	Polyvinylchloride PVC Injection-Moulded Gasketed Fittings for Pressure Applications	IRC	IPC	ISPSC					
B137.3-~~05~~ <u>13</u>	Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications	IRC	IPC	IPSDC					
B137.5-~~05~~ <u>13</u>	Cross-Linked Polyethylene (PEX) Tubing Systems for Pressure Applications	IRC	IPC						
B137.6-~~05~~ <u>13</u>	Chlorinated Polyvinylchloride CPVC Pipe, Tubing and Fittings for Hot and Cold Water Distribution Systems	IRC	IPC	ISPSC					
B137.9-~~02~~ <u>13</u>	Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure-Pipe Systems	IRC	IPC	IMC					
B137.10M-~~05~~ <u>13</u>	Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Composite Pressure-Pipe Systems	IRC	IPC	IMC					
B137.11-~~05~~ <u>13</u>	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	IRC	IPC						
B181.1-~~06~~ <u>11</u>	Acrylonitrile-butadiene-stryrene (ABS) Drain, Waste, and Vent Pipe and Pipe Fittings	IRC	IPC	IPSDC					
B181.2-~~06~~ <u>11</u>	Polyvinylchloride PVC Drain, and chlorinated polyvinylchloride (CPVC) Drain, Waste, and Vent Pipe and Pipe Fittings	IRC	IPC	IPSDC					
B181.3-~~06~~ <u>11</u>	Polyolefin and polyvinylidene <u>fluoride</u> (PVDF) Laboratory Drainage Systems	IRC	IPC						
B182.1- ~~06~~ <u>11</u>	Plastic drain and sewer pipe and pipe fittings	IPC	IPSDC						
B182.2-~~06~~ <u>11</u>	PSM type polyvinylchloride (PVC) sewer pipe and fittings	IRC	IPC	IPSDC					
B182.4-~~06~~ <u>11</u>	Profile polyvinylchloride PVC Sewer Pipe and Fittings	IRC	IPC	IPSDC					
B182.6-~~06~~ <u>11</u>	Profile Polyethylene <u>(PE)</u> Sewer Pipe and Fittings <u>for leak proof sewer applications</u>	IRC	IPC						
B182.8-~~06~~ <u>11</u>	Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings	IRC	IPC						
B356-~~00(2005)~~ <u>10</u>	Water Pressure Reducing Valves for Domestic Water Supply Systems	IPC	IRC						
B481.1-~~07~~ <u>12</u>	Testing and Rating of Grease Interceptors Using Lard	IPC							
B602-~~05~~ <u>10</u>	Mechanical Couplings for Drain, Waste, and Vent Pipe and Sewer Pipe	IRC	IPC	IPSDC					
CAN/CSA A257.1M-~~92~~ <u>2009</u>	Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings	IRC	IPC	IPSDC					
CAN/CSA A257.2M-~~92~~ <u>2009</u>	Reinforced Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings	IRC	IPC	IPSDC					
CAN/CSA A257.3M-~~92~~ <u>2009</u>	Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets	IRC	IPC	IPSDC					
B137.11-~~05~~ <u>13</u>	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	IRC	IPC						

B45.3-02 (R2008)	Porcelain Enameled Steel Plumbing Fixtures	IRC	IPC						
0437-Series-93 (R2006)	Standards on OSB and Waferboard (Reaffirmed 2001)	IRC							
ANSI ~~CSA America~~ FC 1-~~2003~~ 2012 to be relocated under ANSI	Stationary Fuel Cell Power Systems	IFGC	IMC	IRC					
CAN/CSA B366.1-~~2009~~ 2011	Solid-Fuel-Fired Central Heating Appliances	IgCC							
B483.1-~~07~~ 14	Drinking Water Treatment Systems	IRC	IPC						
CSA C22.2 No. 218.1-M89(R~~2006~~ 2011)	Spas, Hot Tubs and Associated Equipment	ISPSC							
C22.2 No. 236 ~~05~~ -11 ~~(R2009) M89(R2006)~~	~~Heating and~~ Cooling Equipment (binational standard with UL 1995)	ISPSC							
C22.2 No. 108-01 (R2010)	Liquid Pump	ISPSC							

CTI — Cooling Technology Institute

Standard Reference Number	Title	Referenced in Code(s):							
STD-201 (~~2009~~ 11)	Standard for Certification of Water Cooling Tower Thermal Performance	IECC							

DASMA — Door and Access Systems Manufacturers

Standard Reference Number	Title	Referenced in Code(s):							
105-92~~(R2004)~~ -13	Test Method for Thermal Transmitance and Air Infiltration of Garage Doors	IECC							
107-97 (R~~2004~~ 2012)	Room Fire Test Standard for Garage Doors Using Foam Plastic Insulation	IBC							
108-~~05~~ 12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference	IBC	IRC						
115-~~05~~ 12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure	IBC	IRC						

FEMA — Federal Emergency Management Agency

Standard Reference Number	Title	Referenced in Code(s):						
FEMA P646-~~08~~ 12	Guidelines for Design of Structures for Vertical Evacuation from Tsunamis	IBC						
FEMA~~- -FA/~~ TB-2-08	Flood-D ~~d~~amage Resistant Materials Requirements	IRC						
~~FIA-TB-11—01~~ FEMA-TB 11—01	Crawlspace Construction for Buildings Located in Special Flood Hazard Area	IBC	IRC					

FM — FM Global

Standard Reference Number	Title	Referenced in Code(s):							
FM 4470 ~~2009~~ 2013	Approval Standard for Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction ~~Covers~~.	IBC							
4474-~~04~~ 11	American National Standard for Evaluating ~~the Simulated Wind Uplift Resistance of~~ Roof/Ceiling Assemblies, -Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, Interior or Exterior Finish Systems ~~Using Static Positive and/or Negative Differential Pressures~~	IBC							
4880 ~~(2005)~~ 2010	Approval Standard for Class 1 Rating of ~~Evaluating~~ Insulated Wall or Wall and Roof/Ceiling Panels, ~~Assemblies, Plastic~~ Interior Finish Materials, ~~Plastic Exterior Building, Wall/Ceiling~~ or Coatings ~~Systems, Interior or~~ and Exterior Finish Systems	IBC	IRC						

GA — Gypsum Association

Standard Reference Number	Title	Referenced in Code(s):								
GA 216-~~07~~ 13	Application and Finishing of Gypsum Panel Products	IBC								
GA-253-~~07~~ 12	~~Recommended Standard Specification for the~~ Application of Gypsum Sheathing	IRC								
GA-600-~~09~~ 12	Fire- Resistance Design Manual, ~~18th~~ 20th Edition	IBC								

HPVA — Hardwood Plywood and Veneer Association

Standard Reference Number	Title	Referenced in Code(s):						
HP-1-~~2009~~ 2013	Standard for Hardwood and Decorative Plywood	IBC	IRC	IgCC				

IAPMO — International Association of Plumbing and Mechanical Officials

Standard Reference Number	Title	Referenced in Code(s):							
CSA B45.5-11/ IAPMO Z124-2011 replaces ANSI Z124.1, 1.2, 2, 3, 4, 6, 9	Plastic Plumbing Fixtures	IRC	IPC						
IAPMO Z124.7-2012 replaces ANSI Z124.7-97	Prefabricated Plastic Spa Shells	ISPSC							

ICC — International Code Council

Standard Reference Number	Title	Referenced in Code(s):							
ICC A117.1-09 14	Accessible and Usable Buildings and Facilities	IBC	IFC	IZC	IEBC	IRC			
IBC-~~12~~ 15	International Building Code	IRC	IFC	IMC	IPC	IPSDC	IFGC	IECC	IEBC IWUIC
IECC-~~12~~ 15	International Energy Conservation Code	IBC	IRC	IMC	IPC	IFGC	IgCC	ISPSC	
IEBC-~~12~~ 15	International Existing Building Code	IBC	IMC	IPMC	IgCC				
IFC-~~12~~ 15	International Fire Code	IBC	IRC	IMC	IPC	IFGC	IECC	IEBC	IPMC
IFGC-~~12~~ 15	International Fuel Gas Code	IBC	IRC	IFC	IMC	IPC	IECC	IEBC	IPMC
IMC-~~12~~ 15	International Mechanical Code	IBC	IRC	IFC	IPC	IFGC	IECC	IEBC	IPMC
ICCPC-~~12~~ 15	International Performance Code	IgCC							
IPC-~~12~~ 15	International Plumbing Code	IBC	IRC	IFC	IMC	IPSDC	IFGC	IEBC	IPMC
IPSDC-~~12~~ 15	International Private Sewage Disposal Code	IBC	IPC	IRC					
IPMC-~~12~~ 15	International Property Maintenance Code	IBC	IRC	IFC	IEBC				
IRC-~~12~~ 15	International Residential Code	IBC	IFC	IMC	IFGC	IEBC	IPC	IPMC	IgCC
IWUIC-~~12~~ 15	International Wildland-Urban Interface Code	IBC	IFC						
IZC-~~12~~ 15	International Zoning Code	IBC	IMC						
ICC 500-~~08~~ 14	ICC/NSSA Standard on the Design and Construction of Storm Shelters	IBC	IRC						
ICC 600-~~08~~ 14	Standard for Residential Construction In High Wind Regions	IBC	IRC						
ICC 700-~~2008~~ 12	National Green Building Standard	IgCC							
IgCC-~~12~~ 15	International Green Construction Code	IBC	ICCPC	IEBC	IECC	IFC	IFGC	IMC	IPC

IES — Illuminating Engineering Society

Standard Reference Number	Title	Referenced in Code(s):							
TM-15-~~07~~ 11	Luminaire Classification System for Outdoor Luminaires	IgCC							

IIAR — International Institute of Ammonia Refrigeration

Standard Reference Number	Title	Referenced in Code(s):							
2-~~99~~ 2014 ~~(Addendum A-2005)~~	~~Addendum A to~~ Equipment, Design, and Installation of Ammonia Mechanical Refrigerating Systems	IMC							

ISEA — International Safety Equipment Association

Standard Reference Number	Title	Referenced in Code(s):							
ANSI/ISEA Z358.1-~~98~~ 2009	Emergency Eyewash and Shower Equipment	IPC							

MSS Manufacturers Standardization Society of the Valve and Fittings Industry

Standard Reference Number	Title	Referenced in Code(s):							
MSS SP-6-~~01~~ 2012	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings	IFGC							
ANSI MSS SP-58 ~~1993~~ 2009	Pipe Hangers and Supports –Materials, Design, Manufacture, Selection, Application, and Installation	IRC	IFGC						
~~SP-69-2002~~ ANSI/MSS SP-58-2009	Pipe Hangers and Supports – Materials, Design, Manufacture, Selection ~~and~~, Application , and Installation *(SP69 will be withdrawn in 2014 and ANSI MSS SP-58-2009 replaces it)*	IMC							

NFPA National Fire Protection Association

Standard Reference Number	Title	Referenced in Code(s):							
10-~~10~~ 13	Standard for Portable Fire Extinguishers	IFC	IBC						
13-~~10~~ 13	Standard for the Installation of Sprinkler Systems	IFC	IBC						
13D-~~10~~ 13	Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes	IFC	IRC	IBC					
13R- ~~10~~ 13	Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies ~~Up to and Including Four Stories in Height~~	IFC	IBC	IEBC					
14-~~10~~ 13	Standard for the Installation of Standpipe, ~~Private Hydrants~~ and Hose Systems	IFC	IBC						
15-12	Standard for the Water Spray Fixed Systems for Fire Protection	IFC							
16-11	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems	IFC	IBC						
17-~~09~~ 13	Standard for Dry Chemical Extinguishing Systems	IFC	IBC						

17A-~~09~~ 13	Standard for Wet Chemical Extinguishing Systems	IFC	IBC						
20- ~~10~~ 13	Standard for the Installation of Stationary Pumps for Fire Protection	IFC	IBC						
22-~~08~~ 13	Standard for the Water Tanks for Private Fire Protection	IFC							
24- ~~10~~ 13	Standard for the Installation of Private Fire Service Mains and Their Appurtenances	IFC							
25-~~11~~ 13	Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems	IFC	IPMC						
30A-~~12~~ 15	Code for Motor Fuel Dispensing Facilities and Repair Garages	IFC	IMC	IFGC					
30B-~~12~~ 15	Code for the Manufacture and Storage of Aerosol Products	IFC							
31-~~11~~ 15	Standard for the Installation of Oil-Burning Equipment	IFC	IRC	IMC	IBC				
32-~~11~~ 15	Drycleaning Plants	IFC	IBC						
33-~~11~~ 15	Standard for Spray Application Using Flammable or Combustible Materials	IFC							
34-~~11~~ 15	Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids	IFC							
35-~~11~~ 15	Standard for Manufacture of Organic Coatings	IFC							
37-~~10~~ 14	Installation and Use of Stationary Combustion Engines and Gas Turbines	IMC	IFGC						
40-~~11~~ 15	Standard for the Storage and Handling of Cellulose Nitrate Film	IFC	IBC						
45-~~11~~ 15	Standard on Fire Protection for Laboratories Using Chemicals	IMC							
~~50-01~~ replaced with 55-13 that incorporates NFPA 50	~~Bulk Oxygen Systems at Consumer Sites~~ Compressed Gases and Cryogenic Fluids Code	IPC							
51- ~~07~~13	Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes	IFC	IPC	IFGC					
51A-12	Standard for Acetylene Cylinder Charging Plants	IFC							

52-~~10~~ 13	Vehicular Fuel Gaseous System Code	IFC							
55–~~10~~ 13	~~Standard for the Storage, Use and Handling of~~ Compressed Gases and Cryogenic Fluids Code ~~in Portable and Stationery Containers Cylinders and Tanks~~	IFC							
58-~~11~~ 13	Liquefied Petroleum Gas Code	IFC	IBC	IRC	IMC	IFGC			
59A ~~10~~ 13	Standard for the Production, Storage and Handling of Liquefied Natural Gas (LNG)	IFC							
61- ~~08~~ 13	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities	IFC	IBC						
69-~~08~~ 14	Standard on Explosion Prevention Systems	IFC	IMC						
72- ~~10~~ 13	National Fire Alarm and Signaling Code	IFC	IBC	IRC	IMC	IEBC	IgCC	IWUIC	
80- ~~10~~ 13	Standard for Fire Doors and Other Opening Protectives	IFC	IBC						
82-~~09~~ 14	Standard on Incinerators, Waste and Linen Handling Systems and Equipment~~, 2009 Edition~~	IMC	IFGC	IBC	IRC				
85-11	Boiler and ~~Construction~~ Combustion Systems Hazards Code	IFC	IBC	IRC	IFGC				
86-~~11~~ 15	Standard for Ovens and Furnaces	IFC							
88A-~~11~~ 15	Standard for Parking Structures	IFGC							
91-~~10~~ 15	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids	IMC							
92~~B – 09~~ 12	Smoke Control ~~Management~~ Systems ~~in Malls, Atria, and Large Spaces~~	IFC	IBC	IMC					
96-~~11~~ 13	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operation	IMC							
99-~~12~~ 15	Health Care Facilities Code	IBC	IFC	IEBC	IBC				
101-~~12~~ 15	Life Safety Code	IBC	IFC	IEBC					
105-~~10~~ 15	~~Installation~~ Standard ~~of~~ for Smoke Door Assemblies and Other Opening Protectives	IBC	IFC						

110-~~10~~ 15	Standard for Emergency and Standby Power Systems	IFC	IBC	IECC					
111-~~10~~ 15	Standard on Stored Electrical Energy Emergency and Standby Power Systems	IFC	IECC	IBC					
120-~~10~~ 15	Standard for Fire Prevention and Control in Coal Mines	IFC	IBC						
160-~~11~~ 15	Standard for the Use of Flame Effects Before an Audience	IFC							
170-~~09~~ 15	Standard for Fire Safety and Emergency Symbols	IFC	IBC						
204-~~07~~ 15	Standard for Smoke and Heat Venting	IFC							
211-~~10~~ 13	Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances	IFC	IBC	IRC	IMC	IFGC			
221-~~09~~ 15	Standard for High Challenge Fire Walls, Fire Walls and Fire Barrier Walls~~, 2009 Edition~~	IBC							
241-~~09~~ 13	Standard for Safeguarding Construction, Alteration, and Demolition Operations	IFC							
253-~~11~~ 15	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	IBC	IFC						
259-~~08~~ 13	Standard Test Method for Potential Heat of Building Materials	IBC	IRC						
260-~~09~~ 13	Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture	IFC							
261-~~09~~ 13	Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes	IFC							
262-~~11~~ 15	Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces	IMC							
274-~~09~~ 13	Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation	IMC							

275-~~10~~ 13	Standard Method of Fire Tests for the Evaluation of Thermal Barriers ~~Used Over Foam Plastic Insulation~~	IBC	IRC						
285-11	Standard Fire Test Method ~~of~~ for the Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components	IBC							
286-~~11~~ 15	Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	IFC	IBC	IRC					
288-12	Standard Methods of Fire Tests of ~~Floor~~ Horizontal Fire Door Assemblies Installed in Horizontal~~ly~~ Fire-Resistance-Rated Floor Systems	IBC							
289-~~09~~ 13	Standard Method of Fire Test for Individual Fuel Packages	IFC	IBC						
318-~~09~~ 15	Standard for the Protection of Semiconductor Fabrication Facilities	IFC							
385- ~~07~~ 12	Standard for Tank Vehicles for Flammable and Combustible Liquids	IFC							
407-12	Standard for Aircraft Fuel Servicing	IFC							
409-~~11~~ 15	Aircraft Hangers	IFC	IBC	IFGC					
~~430-04~~ 400-13	~~Storage of Liquid and Solid Oxidizers~~ Hazardous Material Code	IFC							
484-~~12~~ 15	Standard for Combustible Metals	IFC	IBC						
~~490-10~~ 400-13	Storage of Ammonium Nitrate Hazardous Material Code	IFC							
495-~~10~~ 13	Explosive Materials Code	IFC							
498-~~10~~ 13	Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives	IFC							
501-~~10~~ 13	Standard on Manufactured Housing	IRC							
505-~~11~~ 13	Fire Safety Standard Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations	IFC							

654-~~06~~ 13	Standard for Prevention of Fire & Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids	IBC	IFC						
655-12	Standard for the Prevention of Sulfur Fires and Explosions	IBC	IFC						
664-12	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	IBC	IFC						
701-10	Standard Method~~s~~ of Fire Tests for Flame-Propagation of Textiles and Films	IFC	IBC						
703-~~12~~ 15	Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials	IFC							
704-12	Standard System for the Identification of the Hazards of Materials for Emergency Response	IFC	IMC	IBC					
720-~~09~~ 15	Standard for the Installation of Carbon Monoxide (CO) Warning Equipment Dwelling Units	IFC	IBC	IRC					
750-~~10~~ 13	Standard on Water Mist Fire Protection Systems	IFC	IMC	IFGC					
853-~~10~~ 15	Installation of Stationary Fuel Cell Power Systems	IRC							
1122- ~~08~~ 13	Code for Model Rocketry	IFC							
1123-~~10~~ 13	Code for Fireworks Display	IFC							
1124- ~~08~~ 13	Code for the Manufactur~~e~~ing, Transportation, Storage and Retail Sales of Fireworks and Pyrotechnic Articles	IFC	IBC						
1125-12	Code for the Manufacture of Model Rocket and High Power Rocket Motors	IFC							
1126-~~11~~ 15	Standard for the Use of Pyrotechnics Before a Proximate Audience	IFC							
1127- ~~08~~ 13	Code for High Power Rocketry	IFC							
1142-12	Standard on Water Supply for Suburban and Rural Fire Fighting	IFC							
2001-12	Standard on Clean Agent Fire Extinguishing Systems	IFC	IBC						

NSF	NSF International								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
3~~—2008~~ 2010	Commercial Warewashing Equipment	IPC	IgCC						
14-~~2008e~~ 2011	Plastics Piping System Components and Related Materials	IRC	IPC	ISPSC					
18-~~2007~~ 2012	Manual Food and Beverage Dispensing Equipment	IPC							
40-~~2000~~ 2012	Residential Wastewater Treatment Systems	IPSDC							
41-~~1999~~ 2011	Nonliquid Saturated Treatment Systems ~~(Composing Toilets)~~	IPSDC							
42-~~2007ae~~ 2011	Drinking Water Treatment Units - Aesthetic Effects	IRC	IPC						
44-~~2007~~ 2012	Residential Cation Exchange Water Softeners	IRC	IPC	IgCC					
50-~~2009~~ 2012	Equipment for Swimming Pools, Spas, Hot Tubs, and other Recreational Water Facilities	IgCC	ISPSC						
53-~~2007a~~ 2011a	Drinking Water Treatment Units - Health Effects	IRC	IPC						
58-~~2007~~ 2012	Reverse Osmosis Drinking Water Treatment Systems	IRC	IPC	IgCC					
61-~~2008~~ 2012	Drinking Water System Components - Health Effects	IRC	IPC	IgCC					
62-~~2007~~ 2012	Drinking Water Distillation Systems	IPC							
350-2011	Onsite Residential and Commercial Water Reuse Treatment Systems	IgCC							

PCA	Portland Cement Association								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
100-~~07~~ 12	Prescriptive Design of Exterior Concrete Walls for One and Two-Family Dwellings (Pub. No. EB241)	IRC							

PCI	Prestressed Concrete Institute								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
MNL 124-~~89~~ 11	Design for Fire Resistance of Precast Prestressed Concrete	IBC							

PDI	**Plumbing and Draining Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
PDI G101 ~~(2003)~~ 2012	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data	IPC							

PTI	**Post-Tensioning Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
PTI DC ~~-2007~~ 10.5-12	Standard Requirements for Design and Analysis of Shallow Post-tensioned Concrete Foundation on Expansive Soils~~,~~ ~~Second Edition~~	IBC							
~~PTI DC 2007 10.5-12~~	~~Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils, Third Edition~~	~~IBC~~							

RMI	**Rack Manufacturers Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ANSI/MH16.1~~—08~~ 12	Specification for Design, Testing and Utilization of Industrial Steel Storage Racks	IBC							

SBCA	**Structural Building Components Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
BCSI~~-2008~~ 2013	Building Component Safety Information Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses	IRC							
CFS-BCSI-2008	Cold Formed Steel Building Component Safety Information (CFSBCSI) Guide to Good Practice for Handling, Installing & Bracing of Cold-formed Steel Trusses	IRC							

SMACNA	**Sheet Metal & Air Conditioning Contractors National Assoc. Inc.**

Standard Reference Number	Title	Referenced in Code(s):							
SMACNA-~~85~~ 2012	HVAC Air Duct Leakage Test Manual 2nd Edition	IECC-C	IgCC						
SMACNA-~~/ANSI 2005~~ 2015	HVAC Duct Construction Standards - Metal and Flexible 4th Edition (ANSI)	IMC							

SPRI Single-Ply Roofing Institute

Standard Reference Number	Title	Referenced in Code(s):							
ANSI/SPRI RP-4-~~08~~ 13	Wind Design Guide for Ballasted Single-ply Roofing Systems	IBC							
ANSI/SPRI/FM4435-ES-1-~~03~~ 11	Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems	IBC							

TIA Telecommunications Industry Association

Standard Reference Number	Title	Referenced in Code(s):							
222-G-2005	Structural Standards for Antenna Supporting Structures and Antennas, including - Addendum 1, 222-G-1 dated 2007, ~~and~~ Addendum 2, 222-G-2 Dated 2009, Addendum 3, 222-3 dated 2013, and Addendum 4, 222-G-4 dated 2014	IBC							

TMS The Masonry Society

Standard Reference Number	Title	Referenced in Code(s):							
216-~~97~~ 2013	Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	IBC							
302-~~07~~ 2012	Standard Method for Determining the Sound Transmission ~~Class~~ Rating for Masonry Walls	IBC	IRC	IgCC					
402-~~11~~ 2013	Building Code for Masonry Structures	IBC	IRC						
403-~~10~~ 2013	Direct Design Handbook for Masonry Structures	IBC	IRC						
602-~~11~~ 2013	Specification for Masonry Structures	IBC	IRC						

TPI Truss Plate Institute

Standard Reference Number	Title	Referenced in Code(s):							
TPI 1-2007 2012	National Design Standards for Metal Plate Connected Wood Truss Construction	IBC	IRC						
UL	**Underwriters Laboratories**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
9–2009	Fire Tests of Window Assemblies~~, with Revisions through April 2005~~	IBC							
14B-2008	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors ~~- with Revisions through July 2000~~	IBC							
14C-2006	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs, with revisions through December 2008	IBC							
17-2008	Vent or Chimney Connector Dampers for Oil-Fired Appliances, with Revisions through January 2010	IRC	IMC						
80-2007	Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids with Revisions through August 2009	IRC	IFC						
103-~~2001~~ 2010	Factory-Built Chimneys, for Residential Type and Building Heating Appliances with Revisions through July 2012	IBC	IMC	IFGC	IRC				
127-~~08~~ 2011	Factory-Built Fireplaces ~~- with Revisions through January 2010~~	IBC	IRC	IMC					
142-06	Steel Aboveground Tanks for Flammable and Combustible Liquids with Revisions through February 2010	IFC							
174-04	Household Electric Storage Tank Water Heaters - with Revisions through ~~May 2006~~ September 2012	IRC	IMC						

180-~~03~~ 2012	Liquid-level Indicating Guarges for Oil Burner Fuels~~-with revision through March 2007~~ and Other Combustible Liquids	IRC	IMC						
197-~~2003~~ 2010	Commercial Electric Cooking Appliances - with revisions through ~~March 2006~~ June 2011	IMC							
217–2006	Single and Multiple Stations Smoke Alarms - with revisions through April ~~2010~~ 2012	IBC	IRC	IFC					
263-~~03~~ 2011	Standard for Fire Test of Building Construction and Materials ~~with revisions through October 2007~~	IBC	IRC	IWUIC	IMC				
294-1999	Access Control Systems Units with Revisions through September 2010	IBC	IFC						
300-2005 (R2010)	Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment with Revisions through July 16, 2010	IBC	IFC						
305-~~97~~ 2012	Panic Hardware	IBC	IFC						
325-2002	Door, Drapery, Gate, Louver and Window Operators and Systems - with Revisions through ~~February 2010~~ January 2012	IBC	IFC	IRC					
372-2007	Automatic Electrical Controls for Household and Similar Use - Part 2: Particular Requirements for Burner Ignition Systems and Components with revisions through July ~~25, 2011~~ 2012	ISPSC							
378-06	Draft Equipment, with Revisions through January 2010	IRC	IMC						
391-~~2006~~ 2010	Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces	IMC							
412-~~2004~~ 2011	Refrigeration Unit Coolers - with Revisions through ~~January 2009~~ August 2012	IMC							
499-05	Electric Heating Appliances-with revisions through ~~January 2009~~	IMC							

	April 2012								
555–2006	Fire Dampers-with revisions through May ~~2010~~ 2012	IBC	IMC						
555S–1999	Smoke Dampers - with Revisions through May ~~2010~~ 2012	IBC	IMC						
641~~–1995~~ 2010	Type L Low-Temperature Venting Systems ~~- with Revisions through July 2009~~	IBC	IRC	IMC	IFGC				
651~~–05~~ 2011	Schedule 40 and Schedule 80 Rigid PVC Conduit and Fittings with revisions through March ~~2010~~ 2012	IFGC	IRC						
705-2004 Revision 5	Standard for Power Ventilators ~~with revisions through March 2012~~	IMC							
710B-~~2004~~ 2011	Recirculating Systems ~~with Revisions through December 2009~~	IBC	IFC	IMC					
723—08	Standard for Test for Surface Burning Characteristics of Building Materials with Revisions through September 2010	IBC	IFC	IWUIC	IRC				
726-1995	Oil-Fired Boiler Assemblies - with Revisions through April ~~2010~~ 2011	IRC	IMC	IECC					
729-03	Oil-Fired Floor Furnaces with revisions through ~~April 2010~~ August 2012	IRC	IMC						
730-03	Oil-Fired Wall Furnaces ~~with revisions through April 2010~~ August 2012	IRC	IMC						
731-1995	Oil-Fired Unit Heaters with Revisions through ~~April 2010~~ August 2012	IMC	IECC-C						
737-~~07~~ 2011	Fireplaces Stoves~~- with Revisions through January 2010~~	IRC	IMC						
793-08	Automatically Operated Roof Vents For Smoke and Heat with Revisions through September 2011	IBC	IFC						
795-~~2006~~ 2011	Commercial-Industrial Gas Heating Equipment with revisions through ~~April 2010~~ September 2012	IRC	IFGC						

842-07	Valves for Flammable Fluids, with Revisions through April 2011	IRC	IMC						
858-05	Household Electric Ranges - with Revisions through ~~May 2010~~ April 2012	IMC	IRC						
864-03	Standard for Control Units and Accessories for Fire Alarm Systems-with Revisions through ~~February 2010~~ August 2012	IBC	IFC						
867-~~00~~ 2011	Electrostatic Air Cleaners~~-with Revisions through February 2010~~	IMC							
873-2007	Temperature-Indicating and -Regulating Equipment, with revisions through July ~~25, 2011~~ 2012	ISPSC							
875-09	Electric Day Bath Heaters with revisions through ~~October 2009~~ November 2011	IMC	IRC						
896-1993	Oil-Burning Stoves - with Revisions through May 2010 August 2012	IRC	IMC						
900-04	Air Filter Units- with revisions through ~~November 2009~~ February 2012	IFC	IMC						
907-~~94~~ 2010	Fireplace Accessories - with revisions through ~~July 2006~~ April 2010	IMC							
924-06	Emergency Lighting and Power Equipment with revisions through ~~January 2009~~ February 2011	IBC	IFC						
959-~~2001~~ 2010	Medium Heat Appliance Factory-Built Chimneys - ~~with Revisions through June 2010~~	IRC	IMC	IFGC					
1004-1-~~08~~ 2012	Standard for Rotating Electrical Machines General Requirements with revisions through June 23, 2011	ISPSC							
1026-~~07~~ 2012	Electric Household Cooking and Food Services Appliances	IRC							
1037-99	Antitheft Alarms and Devices with Revisions through December 2009	IFC							
1040-1996	Fire Test of Insulated Wall Construction - with Revisions through September 2007	IBC	IRC						

	October 2012								
1042-~~94~~ 2009	Electric Baseboard Heating Equipment-with revisions through ~~February 2008~~ June 2010	IRC							
1046-~~00~~ 2010	Grease Filters for Exhaust Ducts with revisions through January 2012	IMC							
1081-2008	Standard for Swimming Pool Pumps, Filters and Chlorinators, with revisions through ~~March 31, 2010~~ November 2011	ISPSC							
1240-2005	Electric Commercial Clothes-Drying Equipment - with Revisions through ~~October 2009~~ February 2011	IMC							
1261-2001	Electric Water Heaters for Pools and Tubs - with Revisions through ~~June 16, 2010~~ July 2012	IRC	IMC	ISPSC					
1275-2005	Flammable Liquid Storage Cabinets with Revisions through ~~May 2006~~ February 2010	IFC							
1315-95	Standard for Safety for Metal Waste Paper containers-with Revisions through ~~August 2007~~ September 2012	IFC							
1363-2007	Relocatable Power Taps - with revisions through ~~October 2009~~ September 2012	IFC							
1453-04	Electric Booster and Commercial Storage Tank Water Heaters - with Revisions through December 2009 July 2011	IRC	IMC						
1482-~~10~~ 2011	Solid-Fuel Type Room Heaters	IBC	IRC	IMC	IgCC				
1563-2009	Standard for Electric Hot Tubs, Spas and Association Equipment with revisions through ~~March 31, 2010~~ July 2012	ISPSC							
1673-~~96~~ 2010	Electric Space Heating Cables-with revision through ~~July 2003~~ October 2011	IRC							

1693-~~02~~ 2010	Electric Radiant Heating Panels and Heating Panel Sets, with Revisions through October 2011	IRC							
1703-02	Flat-plate Photovoltaic Modules and Panels - with revisions through ~~April 2008~~ May 2012	IBC							
1738-~~06~~ 2010	Venting Systems for Gas-Burning Appliances, Categories II, III and IV, with Revisions though May 2011	IRC	IFGC						
1741-~~99~~ 2010	Inverters, Converters, Controllers and Interconnection System Equipment with Distributed Energy Resources~~- with revisions through November 2005~~	IRC							
1815-~~09~~ 2012	Standard for Nonducted Heat Recovery Ventilators	IMC							
1897-~~2004~~ 2012	Uplift Tests for Roof Covering Systems ~~with revisions through May 2008~~	IBC							
1978-~~05~~ 2010	Grease Ducts	IMC							
1994-04	Luminous Egress Path Marking Systems with Revisions through ~~April 2010~~ November 2010	IBC	IFC						
1995-~~2005~~ 2011	Heating and Cooling Equipment~~, with revisions through July 2009~~	IRC	IMC	ISPSC					
1996-~~04~~ 2009	Electric Duct Heaters-with revisions through ~~July 2009~~ November 2011	IRC	IMC						
2017-2008	Standards for General-Purpose Signaling Devices and Systems-with Revisions through ~~October 2009~~ May 2011	IBC	IRC						
2024-~~2008~~ 2011	Standard for Safety Optical-Fiber and Communications Cable Raceway ,with Revisions through April 2011	IMC							

2158-1997	For Electric Clothes Dryers - with Revisions through March 2009	IMC							
2158A-~~2006~~ 2010	Outline of Investigation for Clothes Dryer Transition Duct	IRC	IMC						
2200-~~98~~ 2012	Stationary Engine Generator Assemblies ~~with Revisions through December 2009~~	IBC	IFC	IMC	IFGC				
2208-~~2005~~ 2010	Solvent Distillation Units - with Revisions through ~~December 2009~~ March 2011	IFC							
2221-~~2001~~ 2010	Tests of Fire Resistive Grease Duct Enclosure Assemblies	IMC							
2335-~~01~~ 2010	Fire Tests of Storage Pallets-with Revisions through ~~March 2010~~ September 2012	IFC							
2518-~~02~~ 2005	Air Dispersion System Materials	IMC							
2523-09	Standard for Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers, with Revisions through October 2011	IRC	IgCC	IMC					
ULC/CAN	**Underwriters Laboratories Canada**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
CAN/ULC S102.2-~~1988~~ 2010	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies ~~- with 2000 Revisions~~	IBC	IRC						

Reason: *The CP 28 Code Development Policy, Section 4.5.1 requires the updating of referenced standards to be accomplished administratively, and be processed as a Code Change Proposal for consideration by the Administrative Code Change Committee. In September 2012, a letter was sent to each developer of standards that is referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Above is the list of the referenced standards that are to be updated based upon responses from standards developer.*

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

Errata to this proposal are contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information

The following is errata that was not posted to the ICC website.

ASTM D5019, while withdrawn by ASTM, is still referenced in the IBC and IRC, so it will remain in the list of referenced standards. This standard will be removed from this update proposal.

ASTM	ASTM International	
Standard Reference Number	**Title**	**Referenced in Code(s):**
D5019-07a	Specification for Reinforced CSM Polymeric Sheet Used in Roofing Membrane	IBC, IRC

FM 4470 was indicated in the posted errata as being updated to 2013, however, the correct reference is 2012.

FM	FM Global	
Standard Reference Number	**Title**	**Referenced in Code(s):**
FM 4470 ~~2009~~ 2012	Approval Standard for Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.	IBC

Committee Action Hearing Results

ADM62-13

Committee Action: **Approved as Modified**

Modify the proposal as follows:

1. Revise the titles/editions of the following standards as shown:

AISI	American Iron and Steel Institute	
Standard Reference Number	**Title**	**Referenced in Code(s):**
AISI S110-07/S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems-Special Moment Frames, 2007 with Supplement 1, dated 2009, (Reaffirmed 2012)	IBC
AISI S210-07 (2012)	North American Standard for Cold-formed Steel Framing-Floor and Roof System Design, 2007, (Reaffirmed 2012)	IBC
AISI S211-07/S1-12 (2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, 2007, including Supplement 1, dated 2012, (Reaffirmed 2012)	IBC
AISI S212-07 (2012)	North American Standard for Cold-Formed Steel Framing-Header Design, 2007, (Reaffirmed 2012)	IBC
AISI S213-07/S1-09 (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (Reaffirmed 2012)	IBC
AISI S230-07/S3-12 (2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, 2007, with Supplement 3, dated dated 2012, (Reaffirmed 2012)	IBC, IRC

2. Remove the proposed updates to the following standards:

ACI	American Concrete Institute	
Standard Reference Number	**Title**	**Referenced in Code(s):**
318-~~14~~ 11	Building Code Requirements for Structural Concrete	IBC, IRC, ISPSC

ICC	International Code Council	
Standard Reference Number	**Title**	**Referenced in Code(s):**
ICC A117.1-~~2014~~ 2009	Accessible and Useable Buildings and Facilities	IBC, IEBC, IFC, IRC, IZC

3. The following standard is not referenced and should be removed from the IMC Chapter 15.

NFPA	**National Fire Protection Association**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
~~NFPA 274-09~~	~~Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation~~	~~IMC~~

Committee Reason: The proponent indicated that AISI standard references were not revised and updated, but were instead reviewed and reaffirmed in 2012. The committee agreed that it is important to clarify this in the reference.

The committee agreed that the edition of ACI 318 should remain at 2011 instead of being updated to 2014. The specific references to sections in the ACI 318 in the International Codes are coordinated with the 2011 edition. The 2014 edition will be substantially reformatted and renumbered. The 2014 edition must be finalized before it is possible to verify that the references will still be complete and accurate. Some of the revisions to references may be considered technical revisions. This correlation may need to be done as part of the Group A codes changes next cycle. If possible to address this in the public comments for Group B, it should be done.

The committee agreed that the edition of ICC A117.1 should remain 2009 instead of being updated to 2014. The ICC A117.1 is undergoing significant changes in relation to the sizes required for accessibility. At the time of the hearings, the standard has not yet reached the stage of a public draft. Once the revisions are finalized, the scoping requirements in the IBC must be reviewed to understand the full impact on spaces and buildings. Since some of the coordination may include revisions to the codes, the reference of the new edition should be delayed to allow for this coordination effort in the Group A and Group B code change cycles.

The proponent pointed out that NFPA 274 is no longer referenced anywhere in the IMC, however, it is still included in the IMC Chapter 15. Rather than being included in the automatic update proposal, it should be removed from the IMC Chapter 15.

The committee approved the automatic updates for the remainder of the standards listed in the proposal. The proposed updates to the standard are consistent with the ICC policies for updates.

Analysis. A question was raised during the testimony regarding the updating of NFPA 70, National Electrical Code. NFPA 70 will be automatically updated from the 2011 edition to the 2014 edition. The ICC Board of Directors have identified NFPA 70 as a member of the ICC family of codes, therefore, it will not be indicated in the automatic update proposal.

Assembly Action **None**

Individual Consideration Agenda

These items are on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Matthew Senecal, P.E., representing the American Concrete Institute (ACI), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

ACI

318 - ~~11~~ 14 Building Code Requirements for Structural Concrete

Commenter's Reason: At the Dallas Committee Action Hearings, a decision was made to retain the reference to ACI 318-11 instead of updating to the latest edition, ACI 318-14. This was based upon a concern expressed on the floor that, because ACI 318 is going through reorganization, specific ACI 318 section numbers cited within the 2015 IBC may become inconsistent with ACI 318-14, thereby causing confusion to the user..

On July 1, 2013, ACI assembled a task group consisting of the concerned parties to review this issue in detail. The group concluded that If the specific ACI 318 section numbers cited in the 2015 IBC can be editorially changed to the correct ACI 318-14 section numbers, then any potential problem to the user will be avoided.

Editorial changes of this kind are allowed according to Section 4.4 of CP#28. The 318-14 section references compatible with the 2015 IBC have been determined and will be forwarded to ICC Staff for inclusion in the 2015 IBC, and other ICC Codes as appropriate.

It is important to note that there are no technical changes in ACI 318-14 that affect the eight modifications in 2015 IBC Section 1905 or any other provision of the 2015 IBC. This means only the editorial changes discussed above are required to make ACI 318-14 compatible with the 2015 IBC.

ASTM

Public Comment 2:

Marcelo M. Hirschler, representing GBH International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

E814-~~08b~~ 2013	Test Method of Fire Tests of Through-Penetration Firestops
E1537-~~12~~ 2013	Test Method for Fire Testing of Upholstered Furniture

Commenter's Reason: Standards date updates

Public Comment 3:

Marcelo M. Hirschler, representing GBH International, and Steve Mawn, representing ASTM International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

D6662-~~09~~ 2013	Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
E84-20~~12c~~ 2013A	Test Method for Surface Burning Characteristics of Building Materials
E1354-~~2011b~~ 2013	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
E1590-~~12~~ 2013	Test Method for Fire Testing of Mattresses
E2404~~—12~~ 2013E1	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics

Commenter's Reason: Standards date updates

Public Comment 4:

Steve Mawn, representing ASTM International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

A74-~~12~~ 13A	Specification for Cast Iron Soil Pipe and Fittings
A182-~~12A~~ 13	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service
A240/A 240M-~~12~~ 13A	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
A283/A 283M-12A	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
A307-~~10~~ 12	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A312/A 312M-~~12A~~ 13A	Specification for Seamless, and Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
A403-~~12~~ 13	Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings
A480/A480M-~~12~~ 13	Specification for General Requirements for Flat-Rolled Stainless and Heat-/Resisting Steel Plate, Sheet and Strip
A510-~~11~~ 13	Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, Alloy Steel
A572/A 572M-12A	Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

A588/A 588M-~~05~~ 10	Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point, with Atmospheric Corrosion Resistance
A875/A 875M-~~10~~ 13	Standard Specification for Steel Sheet Zinc-5%, Aluminum Alloy-Coated by the Hot-Dip Process
A888-~~11~~ 13A	Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Application
A924/A 924M-~~2010a~~ 13	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process
A1003/A 1003M-~~12~~ 13A	Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-formed Framing Members
A1008/A1008M-12A	Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable
B152/B 152M-~~09~~ 13	Specification for Copper Sheet, Strip Plate and Rolled Bar
B241/B 241M-~~10~~ 12E1	Specification for Aluminum and Aluminum-Alloy, Seamless Pipe and Seamless Extruded Tube
B633-~~11~~ 13	Specification for Electodeposited Coatings of Zinc on Iron and Steel
C33/C33M-~~11a~~ 13	Specification for Concrete Aggregates
C34-~~10~~ 12	Specification for Structural Clay Load-Bearing Wall Tile
C42/C 42M-~~12~~ 13	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C56-~~2010~~ 12	Specification for Limestone Dimension Stone
C59/C 59M-00~~(2006)~~ (2011)	Specification for Gypsum Casting Plaster and Molding Plaster
C62-~~08~~ 13	Specification for Slate Dimension Stone
C67-~~12~~ 13	Test Methods of Sampling and Testing Brick and Structural Clay Tile
C76-~~12a~~ 13A	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C90-~~12~~ 13	Specification for Loadbearing Concrete Masonry Units
C94/C 94M-~~12~~ 13	Specification for Construction of Dry-stacked, Surface-Bonded Walls
C109/C 109M-~~2001b~~ 12	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
C126-~~12~~ 13	Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
C140-~~2012a~~ 13	Test Method Sampling and Testing Concrete Masonry Units and Related Units
C143/C 143M-~~2010a~~ 12	Test Method for Slump of Hydraulic Cement Concrete
C207- ~~2011~~ 06(2011)	Specification for Hydrated Lime for Masonry Purposes
C216-~~12~~ 13	Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)
C317/C 317M-00(2010)	Specification for Gypsum Concrete
C330-/C330M-2009	Specification for Lightweight Aggregates for Structural Concrete
C474-~~12~~ 13	Test Methods for Joint Treatment Materials for Gypsum Board Construction
C578—12ab	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
C587-04(2009)	Specification for Gypsum Veneer Plaster
C595/C95M-~~2012e1~~ 13	Specification for Blended Hydraulic Cements
C615/C615M-~~2011~~ 11	Specification for Granite Dimension Stone
C616/C616M-~~2010~~ 10	Specification for Quartz Dimension Stone
C629- ~~2010~~ 10	Specification for Slate Dimension Stone
C635/C635M-~~12~~ 13	Specification for the Manufacturer, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings

C645-~~11A~~ 13	Specification for Nonstructural Steel Framing Members
C652-~~12~~ 13	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)
C700-~~11~~ 13	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
C728-05 ~~(2010)~~ (2013)	Standard Specification for Perlite Thermal Insulation Board
C926-~~12A~~ 13	Specification for Application of Portland Cement-Based Plaster
C932-06(2013)	Specification for Surface-Applied Bonding Compounds ~~Agents~~ for Exterior Plastering
C933-~~11~~ 13	Specification for Welded Wire Lath
C1019-~~11~~13	Test Method for Sampling and Testing Grout
C1029-~~10~~13	Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
C1063-12~~C~~ D	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
C1072-~~11~~ 13	Standard Text Method for Measurement of Masonry Flexural Bond Strength
C1088-~~09~~ 13	Specification for Thin Veneer Brick Units Made From Clay or Shale
C1107/C1107M -~~11~~ 13	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
C1116/C1116M-10A	Standard Specification for Fiber - Reinforced Concrete and Shotcrete
C1157/C1157M-11	Standard Performance Specification for Hydraulic Cement
C1173-10E1	Specification for Flexible Transition Couplings for Underground Piping Systems
C1186-08(2012)	Specification for Flat Fiber Cement Sheets
C1277-~~11~~ 12	Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings
C1280-~~12A~~ 13	Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing
C1289~~—12a~~ 13E1	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
C1314-~~11A~~ 12	Test Method for Compressive Strength of Masonry Prisms
C1396/1396M-~~11~~ 2013	Specification for Gypsum Ceiling Board
C1513-~~12~~ 2013	Standard Specification for Concrete Roof Tile
C1563-~~08~~ 2013	Standard Test Method for Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent and Storm Piping Applications
D86-~~2011b~~ 2012	Test Method for Distillation of Petroleum Products at Atmospheric Pressure
D92-2012b	Test Method for Flash and Fire Points by Cleveland Open Cup Tester
D93-~~11~~ 2012	Test Method for Flash Point by Pensky-Martens Closed Cup Tester
D1693-~~12~~ 2013	Test Method for Environmental Stress-Cracking of Ethylene Plastics
D1970/D1970M-~~11~~ 2013	Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection
D2239-2012A	Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
D2513-~~12~~ 2013E1	Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings
D2683-2010E1	Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
D2737-2012~~E1~~A	Specification for Polyethylene (PE) Plastic Tubing
D2974-~~07A~~ 2013	Standard Test Methods for Moisture, Ash and Organic Matter of Peat and other Organic Soils
D3035-2012E1	Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
D3161/D3161M-~~12~~ 2013	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)

D3201-~~08AE1~~ 2013	Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products
D3350-~~08~~ 2012E1	Specification for Polyethylene Plastics Pipe and Fittings Materials
D3689-~~07~~2013E1	Test Methods for Deep Foundations Under Static Axial Tensile Load
D3737-~~09E1~~ 2012	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
D4637/D4637M-~~12~~ 2013	Specification for EPDM Sheet Used in Single-Ply Roof Membrane
D5055-~~12~~2013	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists
D5456-~~12~~ 2013	Standard Specification for Evaluation of Structural Composite Lumber Products
D6223/D6223M-02(~~2009)~~(2011)E1	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
D6757-~~07~~ 2013	Standard Specification for Underlayment Felt Containing Inorganic Fibers used in Steep-Slope Roofing
E96/E96M-~~10~~ 2013	Test Method for Water Vapor Transmission of Materials
E1332-90(20~~03~~10A)	Standard Classification for the Determination of Outdoor-Indoor Transmission Class
E1529-~~10~~ 2013	Test Method for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies
E1537-~~12~~ 2013	Test Method for Fire Testing of Upholstered Furniture
E1996-2012A	Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
E2178~~–11~~ 2013	Standard Test Method for Air Permeance of Building Materials
E2307-~~12~~ 2010	Standard Test Method for Determining Fire Resistance of a Perimeter Joint System Between an Exterior Wall Assembly and a Floor Assembly Using the Intermediate-Scale, Multi-story Test Apparatus[1]
E2336-04(2013)	Standard Test Methods Fire Resistive Grease Duct Enclosure Systems
F441/F 441M-~~12~~ 2013	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
F442/F 442M-~~12~~ 2013	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
F714-~~12E1~~ 2013	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
F876-~~10E1~~ 2013	Specification for Crosslinked Polyethylene (PEX) Tubing
F877-2011A	Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
F1055-~~11~~ 2013	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene Pipe and Tubing
F1496-~~12~~ 2013	Standard Test Method for Performance of Convection Ovens
F1807-~~12~~ 2013	Specifications for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing
F2080-~~09~~ 2012	Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-linked Polyethylene (PEX) Pipe
F2200~~—11B~~ 2013	Standard Specification for Automated Vehicular Gate Construction
F2306/F 2306M-~~11~~ 2013	Specification for 12" to 60" 300 to 1500 mm annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

Commenter's Reason: Further revisions to ASTM Standards.

ICC

Public Comment 5:

Jonathan Humble, representing ICC Reference Standards Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

ICC A117.1 – ~~2009~~ 2014 Accessible and Usable Buildings and Facilities

Commenter's Reason (Humble): The ICC Reference Standards Committee (ICC-REF), a committee organized to review standards and provide an opinion of standards compliance based on Council Policy 28, requests that ADM 62-13 be further modified with the incorporation of ICC A117.1-2014 edition.

The ICC-REF disagrees with the ADM code development committee reasons for reverting back to the 2009 edition of ICC A117.1. Contrary to the code development committee's reason concerning significant changes, Section 4.5.1 of the Council Policy does not stipulate any restrictions to modifications to a standards updating. Rather, the intent is that an updated standard should coordinate with the various I-codes in which the standard is referenced. Since this standard is referenced generically in each of the referenced I-codes, and not specifically by individual section number, it is believed that the update will not yield the coordination issues cited in the code development committee's recommendation.

We therefore recommend that ADM62-13 be further modified by the updating of ICC A117.1 to the 2014 edition.

Public Comment 6:

Kenneth Schoonover, KMS Associates, Inc. representing self, requests Approval as Modified by this Public Comment.

Approve the proposed update to ICC/ANSI A117.1-14 for the IBC and the IRC. Retain the reference to ICC/ANSI A117.1-2009 for the IZC, IFC and IEBC.

Commenter's Reason: ICC/ANSI A117.1 Standard is going through its normal revision cycle, which is expected to be complete before the end of this code development cycle. The new edition of A117.1 will be published and available for reference in the 2015 International Codes.

While it is true that there are significant changes, that is not a good reason to freeze the I-Codes reference at the 2009 Edition of the standard. ICC Council Policy #CP28-05 specifically allows an administrative update of a standard to be approved, based upon completion before Dec. 1 of 2014. We anticipate that this standard will be published and available well before December 1, 2014. In writing this rule for completion of a referenced standard a full year after the update is approved, ICC is specifically allowing for completion of technical work on a standard to be completed, with no qualifications regarding the progress of that work. The revisions underway for A117.1 will not impact the content of the 2015 I-Codes. Further, there are a number of reasons why the update to this standard should be approved:

1. If the revisions in question are included in the new standard, there is no good reason not to move forward with them. The changes will have been well vetted, the benefits of the changes have already been established, and the basis for the changes will have been well substantiated.
2. The potential impact on design and construction is no reason delay implementation. It will be several years before the new edition of the I-Codes are widely adopted and enforced. The changes are significant, but not so dramatic as to cause a major upheaval in the design and construction industry. This would not be the first time, or the last, that changes in codes and standards will have had such effect. Designers and builders can and will adapt, and there will be sufficient time to adapt for those who choose to be proactive and plan ahead.
3. There are many other changes and improvements in the standard that will be delayed if the standard is not updated. Among them are revisions that will correlate to a great extent the I-Codes with the new 2010 ADA Standards, which are now adopted and in force. The I-Codes have long sought to be as technically consistent as possible with the ADA Accessibility Guidelines. Designers, builders and building owners benefit from having model codes that match the federal accessibility requirements. Failure to update the standard will be a lost opportunity to continue that benefit.
4. The A117 Committee has, to date, agreed to minimize the impact of the changes on housing. The proposals under consideration by the committee include exceptions to Chapter 10 of the Standard that will limit the spatial impact Accessible, Type A and Type B units.

Analysis: Availability of older editions of a standard are determined by the policies of the standard promulgator. The IFC references the A117.1 in Sections 907.5.2.3.4 (Visible alarms) Group R-2, 1007.9 (Accessible means of egress) Signage and 1010.1 Ramps. Chapters 9 and 10 are repeated in the IBC and IFC. The IZC references the A117.1 in Sections 801.2.4 and 801.3.1. The references are specific to requirements for passenger loading zones and accessible parking spaces. Accessible parking requirements and passenger loading zones are also addressed in the IBC, Section 1106.

Public Comment 7:

Steve Orlowski, representing National Association of Home Builders (NAHB), and Tim Ryan, representing the International Association of Building Officials (IABO), requests Approved as Modified by the Code Committee.

Commenter's Reason: During the code development hearing, the committee agreed that there was a need to modify the list of referenced standard, specifically the updating of the A117.1 standard. CP policy 28 allows for standards that are already referenced in the I-Codes to be updated, even if they are still under development, provide they are completed before December 1, 2014. There are several standards that have been changed or are currently being changed without any opportunity to determine whether the standard should still be referenced in the code or the ability to change the code to reflect changes that have occurred in the standard.

For example the A117 standard is currently discussing changes that may possibly change the required dimensions of clear floor space and dimensions along the accessible route significantly. Without the opportunity to fully understand how existing buildings that were built in accordance with the previous edition of the standard and how the proposed changes will interact with ADA and FHA requirements, NAHB encourages the final assembly to support the modification approved by the committee to not update the reference to the 2014 A117.1 standard.

Public Comment 8:

Robert Eugene, representing UL LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

705-2004 ~~Revision 5~~	Standard for Power Ventilators <u>with revisions through March 2012</u>

Commenter's Reason: This modification provides no technical change. The re-formatting provides consistency with the formatting of the other UL referenced standards.

Public Comment 9:

Robert Eugene, representing UL LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1703-02	Flat-plate Photovoltaic Modules and Panels - with revisions through ~~May 2012~~ <u>November 2014</u>

Commenter's Reason: This modification will incorporate additional fire testing provisions. It will also include various clarifications and editorial revisions to the standard.

Public Comment 10:

Robert Eugene, representing UL LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

14B-2008	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors <u>with revisions through May 3, 2013</u>
14C-2006	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs, with revisions through ~~December 2008~~ <u>May 2013</u>
181A-~~05~~ <u>2013</u>	Closure Systems for Use with Rigid Air Ducts and Air Connectors~~— with Revisions through February 2008~~
181B-~~05~~ <u>2013</u>	Closure Systems for Use with Flexible Air Ducts and Air Connectors~~—with Revisions through February 2008~~
268~~—06~~<u>2009</u>	Smoke Detectors for Fire ~~Prevention Signaling~~ <u>Alarm Systems</u> ~~–with revisions through October 2003~~
325-2002	Door, Drapery, Gate, Louver and Window Operators and Systems - with Revisions through ~~January 2012~~ <u>June 2013</u>
343-2008	Pumps for Oil-Burning Appliances<u> – with revisions through June 2013</u>
441-2010	Gas Vents~~—with Revisions through August 2006~~
471-~~06~~ <u>2010</u>	Commercial Refrigerators and Freezers—with Revisions through ~~October 2008~~ <u>December 2012</u>
499-05	Electric Heating Appliances-with revisions through ~~April 2012~~ <u>February 2013</u>
508-99	Industrial Control Equipment—with Revisions through ~~September 2008~~ <u>March 2013</u>
641~~–1995~~ <u>2010</u>	Type L Low-Temperature Venting Systems <u>with revisions through May 2013</u>
710-~~95~~ <u>2012</u>	Exhaust Hoods for Commercial Cooking Equipment~~—with Revisions through December 2009~~
834-04	Heating, Water Supply and Power Boilers Electric—with Revisions through ~~December 2009~~ <u>January 2013</u>
842-07	Valves for Flammable Fluids, with Revisions through ~~April 2011~~ <u>October 2012</u>
867-~~00~~ <u>2011</u>	Electrostatic Air Cleaners-<u>with Revisions through February 2013</u>
923~~—2008~~ <u>2013</u>	Microwave Cooking Appliances~~—with Revisions through June 2010~~
1042-~~94~~ <u>2009</u>	Electric Baseboard Heating Equipment-with revisions through June ~~2010~~ <u>2013</u>

1081-2008	Standard for Swimming Pool Pumps, Filters and Chlorinators, with revisions through ~~November 2011~~ May 2013
1240-2012	Electric Commercial Clothes-Drying Equipment - with Revisions through ~~February 2011~~ October 2012
1313-93	Standard for Nonmetallic Safety Cans for Petroleum Products—with Revisions through ~~August 2007~~ November 2012
1479-03	Fire Tests of Through-penetration Firestops—with Revisions through ~~*March 2010*~~ October 2012
1618-09	Wall Protectors, Floor Protectors and Hearth Extensions – with revisions through May 2013
1715-97	Fire Test of Interior Finish Material—with Revisions through ~~April 2008~~ January 2013
1812-~~2009~~ 2013	Standard for Ducted Heat Recovery Ventilators~~—with Revisions through June 2010~~
1820-04	Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics—with Revisions through ~~February 2009~~ May 2013
1887-04	Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics—with Revisions through ~~February 2009~~ May 2013
2075-~~04~~ 2013	Standard for Gas and Vapor Detectors and Sensors~~—with revisions through September 2007~~
2079-04	Tests for Fire Resistance of Building Joint Systems—with Revisions through ~~June 2008~~ December 2012
2085-97	Protected Above-ground Tanks for Flammable and Combustible Liquids—with Revisions through ~~December 1999~~ September 2010
2200-2012	Stationary Engine Generator Assemblies-- with Revisions through June 2013
2360-00	Test Methods for Determining the Combustibility Characteristics of Plastics Used in Semi-Conductor Tool Construction—with Revisions through ~~June, 2008~~ May 2013
2523-09	Standard for Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers, with Revisions through ~~October 2011~~ February 2013

Commenter's Reason: This modification provides additional updates to referenced standards revision dates and titles as applicable.

PC1-13

501.4 (New), 501.4.1 (New)

Proposed Change as Submitted

Proponent: Michael Mahoney, Federal Emergency Management Agency, representing the National Earthquake Hazards Reduction Program (mike.mahoney@fema.dhs.gov)

Add text as follows:

501.4 Acceptable Methods. The following methods are considered acceptable methods to comply with Section 501.3.

501.4.1 Seismic Performance Assessment Methodology. Application of the seismic performance assessment methodology in FEMA P-58, including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Section 501.3 of this code.

Add new standards as follows:

CHAPTER 23
REFERENCED STANDARDS

FEMA P-58- January 2013, Seismic Performance Assessment of Buildings

Reason: This new method is being introduced to provide further guidance on performance based design for seismic loads. It introduces and is based on a new seismic performance assessment methodology developed for the Federal Emergency Management Agency (FEMA) under contract with the Applied Technology Council (ATC).

This document introduces a seismic performance assessment methodology as well as the basic building information, response quantities, fragilities, and consequence data that are used as inputs to the methodology. The procedures are probabilistic, uncertainties are explicitly considered, and performance is expressed as the probable consequences, in terms of human losses (deaths and serious injuries), direct economic losses (building repair or replacement costs), and indirect losses (repair time and unsafe placarding) resulting from building damage due to earthquake shaking. The methodology is general enough to be applied to any building type, regardless of age, construction or occupancy; however, basic data on structural and nonstructural damageability and consequence are necessary for its implementation. To allow for practical implementation of the methodology, this product also includes fragility and consequence data for most common structural systems and building occupancies, and an electronic *Performance Assessment Calculation Tool* (PACT) for performing the probabilistic computations and accumulation of losses.

Historically , direct references in this document to design standards have been avoided but as performance design standards emerge it is becoming more important to link these methods and standards with the performance code. Therefore it has been proposed to create a new section in Chapter 5 titled acceptable methods. This same structure could occur in all chapters as these performance based methods are developed and will give a clear quantitative way to comply with this code. Alternatively, at a minimum an appendix should be developed to house these methods so code users can more directly link to quantitative tools.

Appendix C
Structural Acceptable Methods

Section C101
Scope

C101.1 General. This appendix provides acceptable methods for compliance with Chapter 5 of this code.

C102
SEISMIC DESIGN.

C102.1 Seismic Performance Assessment Methodology. Application of the seismic performance assessment methodology in FEMA P-58, including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Chapter 5 of this code.

<u>Section C103</u>
<u>REFERENCED STANDARDS</u>

<u>FEMA P-58- January 2013,   Seismic Performance Assessment of Buildings</u>

Cost Impact: Not applicable

Analysis: A review of the standard proposed for inclusion in the code FEMA P 58 – January 2013 titled Seismic Performance Assessment of Buildings , with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

APP F (NEW)-PC-MAHONEY.DOC

<u>Committee Action Hearing Results</u>

For staff analysis of the content of FEMA P-58 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

This code change was heard by the IFC code development committee.

Committee Action: **Approved as Submitted**

Committee Reason: The addition of FEMA P-58 was felt to be a good tool for performance seismic design and should be included in the ICCPC.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Michael Mahoney, Federal Emergency Management Agency, representing National Earthquake Hazards Reduction Program, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

<u>Appendix C</u>
<u>Acceptable Methods</u>

<u>Section C101</u>
<u>Scope</u>

<u>**C101.1 General.** This appendix provides acceptable methods for compliance with this code.</u>

<u>SECTION C102</u>
<u>SEISMIC DESIGN</u>.

~~**501.4 Acceptable Methods.** The following methods are considered acceptable methods to comply with Section 501.3.~~

<u>C102.1</u>~~501.4.1~~ Seismic Performance Assessment Methodology~~.~~ Application of the seismic performance assessment methodology in FEMA P-58 *<u>series;</u>*~~,~~ *<u>Seismic Performance Assessment of Buildings, Volume 1 – Methodology (FEMA P-58-1),Seismic Performance Assessment of Buildings, Volume 2 – Implementation (FEMA P-58-2), and Seismic Performance Assessment of Buildings, Electronic Materials (FEMA P-58CD),</u>* including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Section 501.3 of this code.

~~CHAPTER 23~~ <u>SECTION C103</u>
<u>REFERENCED STANDARDS</u>

FEMA P-58- January 2013,   Seismic Performance Assessment of Buildings

Commenter's Reason: As originally submitted, this code change was to provide further guidance on performance based design for seismic loads. It introduces a new seismic performance assessment methodology developed for the Federal Emergency Management Agency (FEMA) under contract with the Applied Technology Council (ATC). The FEMA P-58 series introduces a seismic performance assessment methodology as well as the basic building information, response quantities, fragilities, and consequence data that are used as inputs to the methodology. The procedures are probabilistic, uncertainties are explicitly considered, and performance is expressed as the probable consequences, in terms of human losses (deaths and serious injuries), direct economic losses (building repair or replacement costs), and indirect losses (repair time and unsafe placarding) resulting from building damage due to earthquake shaking. The methodology is general enough to be applied to any building type, regardless of age, construction or occupancy; however, basic data on structural and nonstructural damageability and consequence are necessary for its implementation. To allow for practical implementation of the methodology, this product also includes fragility and consequence data for most common structural systems and building occupancies, and an electronic *Performance Assessment Calculation Tool* (PACT) for performing the probabilistic computations and accumulation of losses.

The original code change proposal was submitted directly into the body of the International Performance Code. This was done on the advice of staff. However, FEMA is aware that objections have been raised since the FEMA P-58 document is not a consensus standard. FEMA understands and agrees; it was not our intention to say that it is. However, no such consensus standard on performance based seismic design currently exists. Since there is little guidance available for the design professional, FEMA believes that a reference to our publication would serve the greater good. In order to address those objections, on the advice of staff we are proposing that this language be moved into a general appendix on Acceptable Methods.

Public Comment 2:

Jonathan Humble representing ICC Reference Standards Committee, requests Disapproval.

Commenter's Reason: The ICC Reference Standards Committee (ICC-REF) is a committee that was organized to review standards and provide an opinion of standards compliance based on Council Policy 28.

In this case, the ICC-REF disagrees with the code development committee's position that the introduction of this document as "being a good tool for performance seismic design and should be included in the ICCPC…"

We recommend that this proposal be disapproved as the proposed document to be a reference standard fails to comply with ICC Council Policy 28 in the following ways:

3.6.1.1 - The standard title is not accurately presented in the code change proposal. This FEMA P-58 appears as one single document in the code change proposal when in fact it represents three volumes of material (Volume 1 Methodology, Volume 2 Implementation Guide, and Volume 3 Supporting Electronic Materials and Background Documentation).

3.6.1.2 - The need for this document to be referenced in the ICC Performance code is admirable, but appears to conflict with the intent of the performance code. Since its conception, the ICC Performance Code intentionally does not reference standards directly, but rather relies on Section 104 (Approved Methods) to allow the application of specific codes, standards and other sources or methods. This is further emphasized in Section 101.2 (Intent) that emphasizes the application of an "acceptable level of health, safety and welfare" versus a "minimum" as outlined in the other I-codes. This was further reinforced during the 2007/2008 code hearings when a similar proposal to introduce a reference document through code change PC2-07/08 was disapproved based on the same reasons.

3.6.2.1 - The document contains non-mandatory language in multiple locations.

3.6.2.5 - The document prescribes a proprietary materials, in this case it specifically references the "performance assessment calculation tool".

3.6.2.11 - The document does not state that the document was promulgated according to a consensus process. The document states that it was developed under a contract with a single entity with agencies of the federal government.

3.6.3.2 - The document was not developed or maintained through a consensus process. The document specifically states in the "preface" that the document was produced through a series of contracts with FEMA.

PC1-13

Final Action: AS AM AMPC____ D

PC2-13
1501.2, 1501.3.1, 1501.3.2,1501.4 (New)

Proposed Change as Submitted

Proponent (email): Ryan M. Colker, National Institute of Building Sciences representing National Institute of Building Sciences; Ryan Meres, Institute for Market Transformation, representing Institute for Market Transformation; Greg Towsley,Grundfos, representing Grundfos; Kurt Riesenberg, Spray Polyurethane Foam Alliance, representing Spray Polyurethane Foam Alliance (rcolker@nibs.org)

Add text as follows:

Revise as follows:

SECTION 1501
ENERGY EFFICIENCY

1501.1 Objective. To facilitate efficient use of energy.

1501.2 Functional statement. Buildings shall ~~have provisions ensuring~~ ensure efficient use of ~~nonrenewable~~ energy.

1501.3 Performance requirements.

1501.3.1 Energy performance indices. To provide for the efficient use of ~~depletable~~ energy ~~sources~~, the building envelope and all other building systems impacting energy use including but not limited to mechanical, plumbing and electrical shall be designed and constructed within stated parameters either individually or as a system. These parameters are called the energy performance indices. These indices are the amount of energy ~~from a depletable energy source passing through~~ entering a specified building ~~envelope area~~ or facility during a specified ~~difference in internal and external temperature~~ period of time. These indices are based on the geographic location and ~~region of the country as well as~~ the use of the building. Equivalent energy performance utilizing alternative energy conservation techniques is permitted. In some cases, for certain types of buildings, the local jurisdiction has the authority to choose not to specify energy performance indices.

~~**1501.3.2 Temperature control.** For buildings requiring a controlled temperature, the building design and construction shall take into account various factors. Normally, only insulation, types of windows and related building elements are considered when addressing energy conservation. However, to provide for the efficient use of energy, there are several other items that need to be taken into consideration, such as thermal resistance, solar radiation, air tightness and heat gain or loss from building services.~~

1501.4 Acceptable Methods. The following methods are considered acceptable methods to develop and demonstrate compliance with energy performance indices in Section 1501.3

1501.4.1 Development of indices. In determining the energy performance indices for a building or facility, the following factors shall be used by the authority having jurisdiction:

1. The principal purpose or function of the building or facility;
2. The length of time the building or facility is normally occupied by people;
3. The number of persons normally occupying, visiting, employed in or otherwise using the building, facility or portion of the building or facility
4. The energy use of similar buildings or systems based on occupancy and climate.

5. Anticipated energy use of a building or facility of the same classification in accordance with the latest edition of the *International Energy Conservation Code* or *International Green Construction Code*.
6. The energy use data characterizing a defined stock of buildings relevant to region and the building types being addressed shall be reviewed,

1501.4.2 Establishment of Indices. The energy performance indices shall be established in accordance with Section 1501.4.2.1 or 1501.4.2.2.

1501.4.2.1 Jurisdiction-wide indices. The adopting entity shall establish acceptable indices for all similar buildings covered under this code.

1501.4.2.2 Project-specific indices. The adopting entity shall establish acceptable indices for each individual building or facility to meet.

1501.4.3 Methodology for Compliance. Compliance with the energy indices shall comply with Section 1501.4.3.1 through 1501.4.3.9.

1501.4.3.1 Pre-Occupancy. The expected energy use of the building shall be less than or equal to that determined in accordance with Section 1501.4.1 and 1501.4.2.

1501.4.3.2 Energy Model. The design team shall develop a whole building energy model using software and parameters approved by the code official. ASHRAE 105 and ASHRAE 140 shall be approved methods used in the development of whole building energy models.

1501.4.3.3 Design Submittal. Results of the model and cut sheets of equipment and characteristics contained within the compliant model developed under Section 1501.4.3.2 shall be provided to the code official in accordance with Section 103.3.5. The design team shall determine the expected energy use of the building in accordance with ASHRAE 105.

1501.4.3.4 Permits and Inspections. Permits and inspections shall be based on matching the equipment and characteristics contained in the compliant model under Section 1501.4.3.2 and design report under Section 103.3.4.2.2 with the plan and on-site as required in Section 103.3.6 and Section 103.3.7.

1501.4.3.5 Verification of Compliance Documentation. The design team shall submit documentation verifying compliance with the established bounding conditions in accordance with Section 103.3.8.1.

1501.4.3.6 Issuance of Certificate. The code official is authorized to issue a “Conditional certificate of occupancy” in accordance with Section 103.3.9.1.3 for a time period determined sufficient to demonstrate achievement of the outcome requirement.

1501.4.3.7 Post-Occupancy. The actual energy use of the building shall not be greater than that determined in accordance with Section 1501.4.1 and 1501.4.2.

1501.4.3.8 Reporting of Energy Use. An annual report of energy use is required to be provided by the building owner to the code official in accordance with Section 103.3.10.2 and Section 103.3.10.3.

1501.4.3.9 Violations and Penalties. If the building’s energy use as reported in accordance with Section 1501.4.3.8 is deemed noncompliant, the adopting entity is authorized to determine appropriate penalties in accordance with Section 103.2.10, Section 103.3.10.2, Section103.3.10.3, and Section 103.3.12. The actual penalties shall be set by the jurisdiction in accordance with Section103.3.13.4.

Add new standards as follows:

CHAPTER 23
REFERENCED STANDARDS

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle Atlanta, GA 30329-2305
ASHRAE 105-2007	Standard Methods of Expressing, and Comparing Building Energy Performance
ASHRAE 140—2007	Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs

Reason:

1. There is increasing interest in focusing on actual energy performance of buildings. This is in direct contrast to the current focus by energy codes on building and component design (primarily based on prescriptive requirements) with no requirements for ongoing performance and associated measurement and verification. They also have not generally looked at the building as a whole, other than the ability to adjudge a building based on how an energy simulation predicts it will perform against a clone of itself that is based on the prescriptive requirements.
2. The ICCPC is clear and serves as an appropriate code for inclusion of an outcome-based approach for energy. An approach consistent with the intent of the ICCPC is needed to foster the ability to look at the building as a whole, assess its anticipated performance in the design stage and then confirm delivery of an energy efficient building based on the actual energy use of the building.
3. Software and other tools exist that allow for the accurate modeling of building energy use to predict how a building will perform. Resources included within the ICCPC are §104.2.1: Approved methodologies, Appendix C: Individually Substantiated Design Method and Appendix E: Use of Computer Models. Guidance from the Department of Energy, ASHRAE Standard 105 and ASHRAE 140 and ComNet also may be used.
4. Data exist that provide a basis for accurately stipulating how buildings should perform (e.g. setting annual Energy Use Indices) including the Energy Information Administration Commercial Buildings Energy Consumption Survey and the U.S. Department of Energy/Environmental Protection Agency EnergyStar Program.
5. It is now feasible and more realistic to stipulate how buildings should be designed and constructed in order to yield a certain performance level and be evaluated for compliance with that level.
6. It is also now feasible and more appropriate to also assess how buildings actually perform against an established EUI.
7. The primary challenges currently identified for achievement of outcome-based energy performance include the methodology for setting outcomes, the role of code departments and others in monitoring and enforcing the outcome requirements, the fit within existing energy codes and standards, recourse for non-compliance, and contracting mechanisms for implementing such policies. This proposal is intended to establish optional, code-based criteria for establishment of an outcome-based methodology.
8. The proposal leaves open the opportunity to have post-occupancy compliance conducted by entities outside the code department.

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

Analysis: A review of the standard proposed for inclusion in the code ASHRAE 105-2007, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013. The standard ASHRAE 140 -2007 is currently referenced in the IECC.

1501.2-PC-COLKER-MERES-RESENBERG-TOWSLEY.DOC

Committee Action Hearing Results

For staff analysis of the content of ASHRAE 105-2007 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

This code change was heard by the IECC Commercial code development committee.

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved due to several concerns. First, this will create a potential book keeping problem for code officials. Additionally, the penalty requirements were felt to do little to improve the performance of buildings. Another concern was related to the fact that every jurisdiction will have a different level of performance.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ryan M. Colker representing National Institute of Building Sciences, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION 1501
ENERGY EFFICIENCY

1501.1 Objective. To facilitate efficient use of energy.

1501.2 Functional statement. Buildings shall ~~have provisions ensuring~~ ensure efficient use of ~~nonrenewable~~ energy.

1501.3 Performance requirements.

1501.3.1 Energy performance indices. To provide for the efficient use of ~~depletable~~ energy ~~sources~~, the building envelope and all other building systems impacting energy use including but not limited to mechanical, plumbing and electrical shall be designed and constructed within stated parameters either individually or as a system. These parameters are called the energy performance indices. These indices are the amount of energy ~~from a depletable energy source~~ ~~passing through~~ entering a specified building ~~envelope area~~ or facility during a specified ~~difference in internal and external temperature~~ period of time. These indices are based on the geographic location and ~~region of the country as well as~~ the use of the building. Equivalent energy performance utilizing alternative energy conservation techniques is permitted. In some cases, for certain types of buildings, the local jurisdiction has the authority to choose not to specify energy performance indices.

~~**1501.3.2 Temperature control.** For buildings requiring a controlled temperature, the building design and construction shall take into account various factors. Normally, only insulation, types of windows and related building elements are considered when addressing energy conservation. However, to provide for the efficient use of energy, there are several other items that need to be taken into consideration, such as thermal resistance, solar radiation, air tightness and heat gain or loss from building services.~~

1501.4 Acceptable Methods. The following methods are considered acceptable methods to develop and demonstrate compliance with Energy Performance Indices in Section 1501.3

1501.4.1 Development of indices. In determining the energy performance indices for a building or facility, the following factors shall be used by the authority having jurisdiction:

1. The principal purpose or function of the building or facility;
2. The length of time the building or facility is normally occupied by people;
3. The number of persons normally occupying, visiting, employed in or otherwise using the building, facility or portion of the building or facility
4. The energy use of similar buildings or systems based on occupancy and climate.
5. Anticipated energy use of a building or facility of the same classification in accordance with the latest edition of the *International Energy Conservation Code* or *International Green Construction Code*.
6. The energy use data characterizing a defined stock of buildings relevant to region and the building types being addressed shall be reviewed,

1501.4.2 Establishment of Indices. The energy performance indices shall be established in accordance with Section 1501.4.2.1 or 1501.4.2.2.

1501.4.2.1 Jurisdiction-wide indices. The adopting entity shall establish acceptable indices for similar buildings covered under this code.

1501.4.2.2 Project-specific indices. The adopting entity shall establish acceptable indices for each individual building or facility to meet.

1501.4.3 Preconstruction Demonstration of Indices Compliance. The ability of the design to meet the indices established in Section 1501.4.2 shall be determined in accordance with Section 1501.4.3.1, 1501.4.3.2, or 1501.4.3.3.

1501.4.3.1 Modeled Approach. Approaches using modeling shall be in accordance with Sections 1501.4.3.1.1 and 1501.4.3.1.2

1501.4.3.1.1 Energy Model. The design team shall develop a whole building energy model using software and parameters approved by the code official. ASHRAE 105-2007 and ASHRAE 140 shall be an approved method used in the development of whole building energy models.

1501.4.3.1.2 Design Submittal. Results of the model and cut sheets of equipment and characteristics contained within the compliant model developed under Section 1501.4.3.1.1 shall be provided to the code official in accordance with Section 103.3.5. The design team shall determine the expected energy use of the building in accordance with ASHARE 105-2007.

1501.4.3.2 Pre-Approved System Specifications Approach. The design team shall provide the code official with design documents containing prescriptive requirements for the building envelope and all other building systems impacting energy use that are certified by an entity acceptable to the code official to meet the relevant energy performance indices. The pre-approved specifications shall be provided to the code official in accordance with Section 103.3.5.

1501.4.3.3 Other Approved Methods. The use of other acceptable methods for preconstruction demonstration of indices compliance shall be permissible with the approval of the code official and in accordance with Section 104.3.

1501.4.4 Methodology for Compliance. Compliance with the energy indices shall comply with Section 1501.4.4.1 through 1501.4.4.6.

1501.4.4.1 Pre-Occupancy. The expected energy use of the building shall be less than or equal to that determined in accordance with Section 1501.4.1 and 1501.4.2.

1501.4.4.2 Permits and Inspections. Permits and inspections shall be based on matching the equipment and characteristics contained in the compliant model under Section 1501.4.3.1.2, the pre-approved specification in 1501.4.3.2 or other acceptable methods in 1501.4.3.3 and design report under Section 103.3.4.2.2 with the plan and on-site as required in Section 103.3.6 and Section 103.3.7.

1501.4.4.3 Verification of Compliance Documentation. The design team shall submit documentation verifying compliance with the established bounding conditions in accordance with Section 103.3.8.1.

1501.4.4.4 Issuance of Conditional Certificate. The code official is authorized to issue a "Conditional certificate of occupancy" in accordance with Section 103.3.9.1.3 for a time period determined sufficient to demonstrate achievement of the outcome requirement.

1501.4.4.4.1 Specified Time Period. The time period for demonstration of compliance of the bounding conditions and the operations and maintenance manual shall not exceed five years.

1501.4.4.5 Changed Conditions. If the basis for the requirements under the "conditional certificate of occupancy" or the bounding conditions for the subject building change, Sections 103.3.1.7, 103.3.11.5 and 103.3.11.6 shall apply.

1501.4.4.6 Reporting of Energy Use. A report of annual energy use shall be provided or cause to be provided by the building owner to the code official or other appropriate authority for a time period acceptable to the code official or other appropriate authority to establish compliance with the bounding conditions and the terms of the "conditional certificate of occupancy" under Section 1501.4.4.4.

1501.4.4.7 Post-Occupancy. The actual energy use of the building shall be less than or equal to that determined in accordance with Section 1501.4.1 and 1501.4.2.

1501.4.4.8 Issuance of Certificate. Upon demonstration of compliance with the bounding conditions as determined by the code official, the building owner shall be issued a certificate of occupancy.

1501.5. Violations and Penalties. If the building's energy use as reported in accordance with Section 1501.4.4.6 is deemed noncompliant, the adopting entity may determine appropriate penalties in accordance with Section 103.2.10, Section 103.3.10.2, Section103.3.10.3, and Section 103.3.12. The actual penalties shall be set by the jurisdiction as per Section103.3.13.4.

CHAPTER 23
REFERENCED STANDARDS

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle Atlanta, GA 30329-2305
ASHRAE 105-2007	Standard Methods of Expressing, and Comparing Building Energy Performance
ASHRAE 140—2007	Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs

Commenter's Reason:

- This revision reflects discussions with opponents to the code change following the Committee Action Hearings and also addresses the Committee's reasoning for disapproval.

- It is important to note that the proposal is intended to modify the ICC Performance Code (ICCPC) whose purpose is "to provide appropriate health, safety, welfare, and social and economic value, while promoting innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources." (ICCPC §101.1).
- The current provisions for energy efficiency in Chapter 15 of the ICCPC are inadequate to cover all the parameters addressed by the IECC.
- The primary challenges currently identified for achievement of outcome-based energy performance include the methodology for setting outcomes, the role of code departments and others in monitoring and enforcing the outcome requirements, the fit within existing energy codes and standards, recourse for non-compliance, and contracting mechanisms for implementing such policies. This proposal is intended to establish optional, code-based criteria for establishment of an outcome-based methodology.
- There is increasing interest in focusing on actual energy performance of buildings. This is in direct contrast to the current focus by energy codes on building and component design (primarily based on prescriptive requirements) with no requirements for ongoing performance and associated measurement and verification. They also have not generally looked at the building as a whole, other than the ability to adjudge a building based on how an energy simulation predicts it will perform against a clone of itself that is based on the prescriptive requirements.
- The ICCPC is clear and serves as an appropriate code for inclusion of an outcome-based approach for energy. An approach consistent with the intent of the ICCPC is needed to foster the ability to look at the building as a whole, assess its anticipated performance in the design stage and then confirm delivery of an energy efficient building based on the actual energy use of the building.

PC2-13

Final Action: AS AM AMPC____ D

PC3-13
Section 1501.4 (New)

Proposed Change as Submitted

Proponent: Jim Edelson, representing New Buildings Institute (jedelson@comcast.net)

Add text as follows:

1501.4 Acceptable Methods. The following methods are considered acceptable methods to satisfy the performance requirements in Section 1501.3.

1501.4.1 Outcome based compliance. The measurement of actual energy used to demonstrate compliance with Section 1501.3 shall be in accordance with Sections 1501.4.1.1 through 1501.4.1.4.

1501.4.1.1 Calculations. All energy usage shall be converted into units consistent with the energy units established by Section 1501.3.1.

1501.4.1.2 Certificate of Occupancy. Prior to the issuance of the certificate of occupancy and upon completion of construction, the *building* owner shall submit an operational plan to the *authority having jurisdiction* that includes the certification of the owner and an architect, engineer or general contractor under contract to the owner for monitoring and reporting energy use over a continuous 12-month period. The plan shall include the method for reporting actual energy use of the *building* in the format of the energy performance indices established by Section 1501.3.1.

1501.4.1.3 Occupancy. The metered, measured or billed energy use of the building shall be apportioned based on the occupancy period and square footage of the actual occupancy of the building during the 12-month period of monitoring energy use. Where multiple tenants or multiple occupancies exist, their tenancy or occupancy in the building shall be attested to by an affidavit signed by all building tenants indicating the time periods and square footage of the building portion occupied.

1501.4.1.4 Certificate of Acceptance. An application for Certificate of Acceptance is required to be filed with the *authority having jurisdiction* within 36 months of receiving a final Certificate of Occupancy. The application for the Certificate of Acceptance shall indicate that the owner and an architect, engineer or general contractor under contract to the owner have determined that the building has met the performance requirement established by Section 1501.3.1. Upon receipt of the completed application, a Certificate of Acceptance shall be provided to the building owner.

Reason: Since the first energy codes, compliance has not been based on actual building performance but rather on tried and true means of improving the performance of buildings: more insulation, better windows, better equipment, more efficient lighting, etc. This effectively made the goal of energy codes to create more efficient buildings rather than to create buildings that attain a certain level of efficiency. This current method of compliance leaves a whole range of factors that impact energy efficiency, from design to occupancy, unaddressed and unregulated by the code. In the design phase, these factors include orientation, system selection, passive characteristics, etc. In the occupancy phase, these factors include control strategies, occupant density, equipment maintenance, plug loads, etc.

The result is a misalignment between the energy codes and how buildings actually perform. Not only does this leave a large portion of building energy use unaddressed, it means that many very effective means of achieving energy efficiency, especially many new technologies, cannot be used to achieve code compliance. As technologies become more complex, and the 'unregulated' portions of building energy use increase, the traditional prescriptive-based energy codes will become less and less able to impact the actual energy performance of buildings. The significant increases in stringency contained in the 2012 version of the International Energy Conservation Code accelerated the pace at which this is occurring.

The ICC Performance Code is formulated around a concept of flexibility. Rather than prescribing the details that lead to a desired outcome, the ICCPC requires a desired performance – a desired outcome – and then provides flexibility as to how that outcome is reached. This makes it a natural fit for an approach to energy efficiency that uses actual outcomes rather than performance proxies (insulation levels, equipment efficiency, etc.) to demonstrate compliance.

In section 1501.3.1, the ICCPC already contains a mechanism that allows jurisdictions to set performance targets. This proposal adds a new section 1501.4 that allows projects to demonstrate compliance with those performance targets through the measurement of actual energy performance. The outcome-based compliance option relies upon actual measurement of the performance of a building after it is occupied and fully operational. Only then can the owner be fully cognizant of the true energy costs and possibilities for management of the use and application of energy savings.

A certificate of occupancy is necessary to allow the building to be occupied despite the fact that outcome-based compliance has not been determined, and cannot be determined. Responsibility for monitoring and recording the energy used and energy produced by the building and the building site falls to the design team, including the owner, architect, engineer and even contractors. They are all part of the process of preparing an operational plan that indicates the measurement methodology and how they intend to comply with the performance target set in 1501.3.

Occupancy factors for the actual tenants are required to be factored into the calculation of energy consumption if there are multiple tenants in a building. With at least a full year of testing and evaluation of the building performance, the team can determine whether the results meet the anticipated goal. The compliance path sets a period of 36 months in which to demonstrate compliance. This 3-year period permits time to allow for the building to become as fully occupied as possible and to come up to speed with the operational features. This will also give the design team sufficient time to modify and adjust the various key elements of the building that are affecting the building's energy consumption.

Finally, there is documentation submitted to the jurisdiction for a certificate of acceptance. The design team provides the information that has been gathered in accordance with their procedures and it only requires that the documentation be entered into the building project record. The owner simply gets a Certificate of Acceptance indicating this step in the process has been completed. While this process provides only a promise that the building will perform, this is not different from the method of determining compliance with the computer simulation approach that is already in almost every energy code.

This proposal does not require that all buildings demonstrate compliance with the ICCPC by using actual energy outcomes. The permissive language only makes the proposed option available for those projects that desire it. It closes the gap between the code and actual energy outcomes, and brings the full range of factors that impact energy performance as an option into the ICCPC.

Cost Impact: There is no cost impact to this proposal.

1501.4 (NEW)-PC-EDELSON.DOC

Committee Action Hearing Results

This code change was heard by the IECC Commercial code development committee.

Committee Action: Disapproved

Committee Reason: The concept of certificate of acceptance was felt to be unenforceable and there was a concern with the lack of penalty if the requirements were not met.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Edelson, New Buildings Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1501.4 Acceptable Methods. The following methods are considered acceptable methods to satisfy the performance requirements in Section 1501.3.

1501.4.1 Outcome based compliance. The measurement of actual energy used to demonstrate compliance with Section 1501.3 shall be in accordance with Sections 1501.4.1.1 through 1501.4.1.4.

1501.4.1.1 Calculations. All energy usage shall be converted into units consistent with the energy units established by Section 1501.3.1.

1501.4.1.2 Certificate of Occupancy. Prior to the issuance of the certificate of occupancy and upon completion of construction, the *building* owner shall submit an operational plan to the *authority having jurisdiction* that includes the certification of the owner and an architect, engineer or general contractor under contract to the owner for monitoring and reporting energy use over a continuous 12-month period. The plan shall include the method for reporting actual energy use of the *building* in the format of the energy performance indices established by Section 1501.3.1.

1501.4.1.3 Occupancy <u>and Reporting</u>. The metered, measured or billed energy use of the building shall be apportioned based on the occupancy period and square footage of the actual occupancy of the building during the 12-month period of monitoring energy use. Where multiple tenants or multiple occupancies exist, their tenancy or occupancy in the building shall be attested to by an affidavit signed by all building tenants indicating the time periods and square footage of the building portion occupied. A report of the actual energy use shall be filed with *authority having jurisdiction* no later than 36 months after receiving a final Certificate of Occupancy,

1501.4.1.4 **Enforcement and Violations.** If the actual energy use reported according to Section 1501.4.1.3 exceeds the energy performance indices established according to Section 1501.3, administration and enforcement shall be in accordance with Sections 101.3.12 and 101.3.13.

~~**Certificate of Acceptance.** An application for Certificate of Acceptance is required to be filed with the *authority having jurisdiction* within 36 months of receiving a final Certificate of Occupancy. The application for the Certificate of Acceptance shall indicate that the owner and an architect, engineer or general contractor under contract to the owner have determined that the building has met the performance requirement established by Section 1501.3.1. Upon receipt of the completed application, a Certificate of Acceptance shall be provided to the building owner.~~

Commenter's Reason: The Committee's Reason for disapproval concerned the requirement for a "Certificate of Acceptance" and a concern that there was a "lack of penalty". This Comment responds to those concerns by deleting the "Certificate of Acceptance" section, and referencing the enforcement and violations provision included elsewhere in the ICCPC. The Proposal as Modified will provide jurisdictions with an Acceptable Method such that they can ensure compliance with the energy provisions in the ICCPC is being met by actual energy use that is metered, measured, or billed.

PC3-13

Final Action: AS AM AMPC____ D

CE1-13, Part I

C101.2, C101.3, C101.3.1 (NEW), C101.3.2 (NEW), C101.4.2, C101.4.3, C101.4.6 (NEW), C101.4.6.1, C101.4.6.2, C101.4.6.3, C101.5, C102, C102.1, C102.1.1, R101.2, R101.3 (IRC N11101.2), R101.3.1 (NEW) (IRC N1101.2.1 (NEW)), R101.3.2 (NEW) (IRC N1101.2.2 (NEW)), R101.4.2, R101.4.3 (IRC N1101.3), R101.4.6 (NEW), R101.4.6.1, R101.4.6.2, R101.4.6.3 (NEW), R101.5 (IRC N1101.5 (NEW)), R102, R102.1, R102.1.1 (IRC N1101.7)

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.2 Scope. This code applies to *commercial buildings* <u>and *residential buildings*</u>, ~~and~~ the building sites and associated systems and equipment. <u>*Commercial buildings* shall meet the requirements of the commercial provisions of this code, designated with a prefix "C". *Residential buildings* shall meet the requirements of the residential provisions of this code, designated with a prefix "R". Provisions without a designation “C” or “R” apply to all buildings.</u>

C101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. ~~This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective.~~ This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

<u>**C101.3.1 Alternate materials, systems, approaches or techniques.** This code is intended to provide flexibility to permit the use of innovative materials, systems, approaches or techniques to achieve this objective, provided such alternate proposals are *approved* by the *code official*.</u>

<u>**C101.3.2 Above-code programs.** The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as «mandatory» in Chapters C4 and R4 shall be met.</u>

~~**C101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**C101.4.3**~~ <u>**C101.4.2**</u> **Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. ~~Additions, alterations, renovations or repairs shall not create~~

~~an unsafe or hazardous condition or overload existing building systems.~~ An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
7. Alterations that replace less than 50 percent of the luminaires in a space <u>less than 5000 square feet</u>, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the ~~bulb~~ <u>lamp</u> and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

~~C101.4.4~~ <u>C101.4.3</u> Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

~~C101.4.5~~ <u>C101.4.4</u> Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

~~C101.4.6~~ <u>C101.4.5</u> Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

<u>**C101.4.6 Exempt buildings or work.** The following buildings or portions thereof shall be exempt from this code:</u>

<u>**C101.4.6.1 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, is exempt from this code.</u>

<u>**C101.4.6.2 Certain additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs, to the extent that compliance with this code would create an unsafe or hazardous condition or overload existing building systems, and for which there is not a feasible compliant alternative, shall be exempt from this code.</u>

<u>**C101.4.6.3 Envelope assemblies of low-energy buildings.** The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code, shall be exempt from the *building thermal envelope* provisions of this code:</u>

1. Those with a peak design rate of energy usage less than 3.4. Btu/h /ft^2 (10.7 W/m^2) or 1.0 watt/ft2 (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

~~**C101.5 Compliance.** Residential buildings shall meet the provisions of IECC-Residential Provisions. Commercial buildings shall meet the provisions of IECC-Commercial Provisions~~.

C101.5 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

~~**C101.5.1 Compliance materials.** The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code~~.

~~**SECTION C102**~~
~~**ALTERNATE MATERIALS – METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS**~~

~~**C102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**C102.1.1 Above code programs.** The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.~~

Reason: This proposed change reorganizes Section 101 to provide greater clarity regarding intent and flexibility, applicability and exemptions, and compliance materials, all as part of the Scope and General Requirements section. This will help both the code official and the registered design professional to understand how these important concepts apply.

Cost Impact: The code change proposal will not increase the cost of construction. It clarifies a framework for the energy code and does not affect either design or construction.

C101.2-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: While the proponent's intent was to simplify the administrative provisions, the committee found them to be more complex. It contained many ambiguous terms which would made administration of the code difficult. There was redundancy of the scoping sections introduced by the proposal. Finally, there was no justification for the 5000 square foot threshold introduced into the existing building exceptions.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing Self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C101.1 Title. [Text unchanged]

C101.2 Scope. These Commercial Provisions of this code apply ~~This code applies~~ to *commercial buildings* and the buildings sites and associated systems and equipment.

C101.3 Intent. [Text unchanged]

C101.3.1 Alternate materials, systems, approaches or techniques. The use of innovative materials, systems, approaches or techniques is permitted to achieve this objective provided such alternate proposals are *approved* by the *code official*.

C101.3.2 Above-code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 of these commercial provisions shall be met.

C101.4 Applicability. [Unchanged]

C101.4.1 Existing buildings. [Unchanged]

~~**C101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~C101.4.3~~ C101.4.2 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exceptions: [Text unchanged except as follows]

7. Alterations that replace less than 50 percent of the luminaires in a space less than 5000 square feet, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the ~~bulb~~lamp and ballast within the existing luminaires in a space less than 1000 square feet, provided that the alteration does not increase the installed interior lighting power.

~~C101.4.4~~ C101.4.3 Change in occupancy or use. [Text unchanged]

~~C101.4.5~~ C101.4.4 Change in space conditioning. [Text unchanged]

~~C101.4.6~~ C101.4.5 Mixed occupancy. [Text unchanged]

C101.4.6 Exempt buildings or work. The following buildings or portions thereof shall be exempt from this code:

C101.4.6.1 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, ~~are~~ is exempt from this code.

C101.4.6.2 Certain additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs, to the extent that compliance with this code would create an unsafe or hazardous condition or overload existing building systems, and for which there is not a feasible compliant alternative as accepted by the code official, shall be exempt from this code.

C101.4.6.3 Envelope assemblies of low-energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code, shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4. Btu/h /ft2 (10.7 W/m2) or 1.0 watt/ft2 (10.7 W/m2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

C101.5 Compliance materials. ~~Residential buildings shall meet the provisions of IECC-Residential Provisions. Commercial buildings shall meet the provisions of IECC-Commercial Provisions.~~
~~C101.5.1 Compliance materials.~~ The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

Delete without substitution:

~~**SECTION C102**~~
~~**ALTERNATE MATERIALS – METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS**~~

~~**C102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**C102.1.1 Above code programs.** The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.~~

Commenter's Reason: As Chief Sustainability Officer of the New York City Department of Buildings from 2002-12, and in writing the legislation and administrative provisions for the New York City Energy Conservation Code, I found Chapter 1 of the IECC disorganized, redundant and confusing to interpret. In addition, it did not offer substantive assistance as to how the IECC could or should be administered and enforced. Our mayor vigorously and specifically wanted a strongly enforced energy code. We worked hard to develop a structure which would accommodate both high-rise commercial buildings and single-family homes. The structure in this proposal and in CE35-13 reflects an experienced view of that protocol, and it is offered for other jurisdictions that want good compliance with the IECC.

Specifically, the Intent section should reflect the entire intent of the code. Sections C102 and R102 of the 2012 IECC return to the issue with little added substance to Sections C101.3 and R101.3, and have therefore been folded into the Intent section. Similarly, the Applicability section should include a paragraph on Exemptions, and within that group the miscellaneous exemptions in Sections C101 and R101; thus, historic buildings, certain alterations and the envelopes of low-energy buildings or additions are brought under a new Exemptions section. And Compliance Materials appropriately becomes its own section.

This proposed modification of the 2012 IECC reorganizes the 2012 sections, but neither adds nor eliminates content. It is improved from the April Code Development proposal in separating out Parts I and II and acknowledging slight differences between them. This modification also differs from the Code Development proposal in that it does NOT address the issue of separation of the residential and commercial administrative provisions from the single set of administrative provisions approved in the 2010 Final Action Hearing – this issue is addressed in a separate public comment

CE1-13, Part I
Final Action: AS AM AMPC____ D

CE1-13, Part II

C101.2, C101.3, C101.3.1 (NEW), C101.3.2 (NEW), C101.4.2, C101.4.3, C101.4.6 (NEW), C101.4.6.1, C101.4.6.2, C101.4.6.3, C101.5, C102, C102.1, C102.1.1, R101.2, R101.3 (IRC N11101.2), R101.3.1 (NEW) (IRC N1101.2.1 (NEW)), R101.3.2 (NEW) (IRC N1101.2.2 (NEW)), R101.4.2, R101.4.3 (IRC N1101.3), R101.4.6 (NEW), R101.4.6.1, R101.4.6.2, R101.4.6.3 (NEW), R101.5 (IRC N1101.5 (NEW)), R102, R102.1, R102.1.1 (IRC N1101.7)

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.2 Scope. This code applies to *residential buildings* and *commercial buildings* the buildings sites and associated systems and equipment. *Commercial buildings* shall meet the requirements of the commercial provisions of this code, designated with a prefix "C". *Residential buildings* shall meet the requirements of the residential provisions of this code, designated with a prefix "R". Provisions without a designation “C” or “R” apply to all buildings.

R101.3 (N1101.2) Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. ~~This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective.~~ This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

R101.3.1 (N1101.2.1) Alternate materials, systems, approaches or techniques. This code is intended to provide flexibility to permit the use of innovative materials, systems, approaches or techniques to achieve this objective, provided such alternate proposals are *approved* by the *code official*.

R101.3.2 (N1101.2.2) Above-code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as «mandatory» in Chapters C4 and R4 shall be met.

~~**R101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**R101.4.3 (N1101.3)**~~ **R101.4.2 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. ~~Additions, alterations, renovations or repairs~~

~~shall not create an unsafe or hazardous condition or overload existing building systems.~~ An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
7. Alterations that replace less than 50 percent of the luminaires in a space less than 5000 square feet, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the ~~bulb~~ lamp and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

~~R101.4.4~~ R101.4.3 Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

~~R101.4.5 (N1101.4)~~ R101.4.4 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

~~R101.4.6~~ R101.4.5 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

R101.4.6 Exempt buildings or work. The following buildings or portions thereof shall be exempt from this code:

R101.4.6.1 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, is exempt from this code.

R101.4.6.2 Certain additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs, to the extent that compliance with this code would create an unsafe or hazardous condition or overload existing building systems, and for which there is not a feasible compliant alternative, shall be exempt from this code.

R101.4.6.3 Envelope assemblies of low-energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code, shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4. Btu/h /ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

~~**R101.5 Compliance.** Residential buildings shall meet the provisions of IECC-Residential Provisions. Commercial buildings shall meet the provisions of IECC-Commercial Provisions~~.

R101.5 (N1101.5) Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

~~**R101.5.1 (N1101.5) Compliance materials.** The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code~~.

~~SECTION R102~~
~~ALTERNATE MATERIALS – METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS~~

~~**R102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**R102.1.1 (N1101.7) Above code programs.** The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.~~

Reason: This proposed change reorganizes Section 101 to provide greater clarity regarding intent and flexibility, applicability and exemptions, and compliance materials, all as part of the Scope and General Requirements section. This will help both the code official and the registered design professional to understand how these important concepts apply.

Cost Impact: The code change proposal will not increase the cost of construction. It clarifies a framework for the energy code and does not affect either design or construction.

C101.2-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The proposal contains some technical flaws, particularly in the text related to above code programs.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment 1:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal asfollows:

R101.1 Title. [Text unchanged]

R101.2 Scope. These Residential Provisions of this code apply ~~This code applies~~ to *residential buildings* and the buildings sites and associated systems and equipment.

R101.3 Intent. [Text unchanged]

R101.3.1 Alternate materials, systems, approaches or techniques. The use of innovative materials, systems, approaches or techniques is permitted to achieve this objective provided such alternate proposals are *approved* by the *code official*.

R101.3.2 Above-code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as “mandatory” in Chapter 4 of these residential provisions shall be met.

R101.4 Applicability. [Unchanged]

R101.4.1 Existing buildings. [Unchanged]

~~**R101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~R101.4.3~~ R101.4.2 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: [Text unchanged except as follows]

7. Alterations that replace less than 50 percent of the luminaires in a space less than 5000 square feet, provided that such alterations do not increase the installed interior lighting power.

8. Alterations that replace only the ~~bulb~~ lamp and ballast within the existing luminaires in a space less than 1000 square feet, provided that the alteration does not increase the installed interior lighting power.

~~R101.4.4~~ R101.4.3 Change in occupancy or use. [Text unchanged]

~~R101.4.5~~ R101.4.4 Change in space conditioning. [Text unchanged]

~~R101.4.6~~ R104.4.5 Mixed occupancy. [Text unchanged]

R101.4.6 Exempt buildings or work. The following buildings or portions thereof shall be exempt from this code:

R101.4.6.1 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, ~~are~~ is exempt from this code.

R101.4.6.2 Certain additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs, to the extent that compliance with this code would create an unsafe or hazardous condition or overload existing building systems, and for which there is not a feasible compliant alternative as accepted by the code official, shall be exempt from this code.

R101.4.6.3 Envelope assemblies of low-energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code, shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4. Btu/h /ft2 (10.7 W/m2) or 1.0 watt/ft2 (10.7 W/m2) of floor area for space conditioning purposes.

2. Those that do not contain *conditioned space*.

R101.5 Compliance materials. ~~Residential buildings shall meet the provisions of IECC-Residential Provisions. Commercial buildings shall meet the provisions of IECC-Commercial Provisions.~~

~~**C101.5.1 Compliance materials.**~~ The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

~~**SECTION R102**~~
~~**ALTERNATE MATERIALS – METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS**~~

~~**R102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**R102.1.1 Above code programs.** The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.~~

Commenter's Reason: As Chief Sustainability Officer of the New York City Department of Buildings from 2002-12, and in writing the legislation and administrative provisions for the New York City Energy Conservation Code, I found Chapter 1 of the IECC disorganized, redundant and confusing to interpret. In addition, it did not offer substantive assistance as to how the IECC could or should be administered and enforced. Our mayor vigorously and specifically wanted a strongly enforced energy code. We worked hard to develop a structure which would accommodate both high-rise commercial buildings and single-family homes. The structure in this proposal and in CE35-13 reflects an experienced view of that protocol, and it is offered for other jurisdictions that want good compliance with the IECC.

Specifically, the Intent section should reflect the entire intent of the code. Sections C102 and R102 of the 2012 IECC return to the issue with little added substance to Sections C101.3 and R101.3, and have therefore been folded into the Intent section. Similarly, the Applicability section should include a paragraph on Exemptions, and within that group the miscellaneous exemptions in Sections C101 and R101; thus, historic buildings, certain alterations and the envelopes of low-energy buildings or additions are brought under a new Exemptions section. And Compliance Materials appropriately becomes its own section.

This proposed modification of the 2012 IECC reorganizes the 2012 sections, but neither adds nor eliminates content. It is improved from the April Code Development proposal in separating out Parts I and II and acknowledging slight differences between them. This modification also differs from the Code Development proposal in that it does NOT address the issue of separation of the residential and commercial administrative provisions from the single set of administrative provisions approved in the 2010 Final Action Hearing – this issue is addressed in a separate public comment.

Public Comment 2:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R101.2 Scope. This code applies to *residential buildings* and the buildings sites and associated systems and equipment. Chapter 1 of these residential provisions shall incorporate Chapter 1 of the commercial provisions by reference, changing all references to "*commercial buildings*" to "*residential buildings*," unless the referenced commercial provisions are amended herein.

Delete without substitution:

~~**R101.3 Intent.** This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.~~

~~**R101.4 Applicability.** Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.~~

~~**R101.4.1 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**R101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**R101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

~~**R101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.~~

~~**R101.4.5 Change in space conditioning.** Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.~~

~~**R101.4.6 Mixed occupancy.** Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of the IECC—Commercial and Residential Provisions.~~

~~**R101.5 Compliance.** *Residential buildings* shall meet the provisions of IECC—Residential Provisions. *Commercial buildings* shall meet the provisions of IECC—Commercial Provisions.~~

~~**R101.5.1 Compliance materials.** The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.~~

~~**R101.5.2 Low energy buildings.** The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:~~

1. ~~Those with a peak design rate of energy usage less than 3.4 Btu/h · ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.~~
2. ~~Those that do not contain *conditioned space*.~~

~~SECTION R102~~
~~ALTERNATE MATERIALS—METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS~~

~~**R102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**R102.1.1 Above code programs.** The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an~~

~~energy efficiency program shall be considered in compliance with this code. The requirements identified as “mandatory” in Chapter 4 shall be met.~~

~~PART 2—ADMINISTRATION AND ENFORCEMENT~~
~~SECTION R103~~
~~CONSTRUCTION DOCUMENTS~~

~~**R103.1 General.** Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.~~

> ~~**Exception:** The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.~~

~~**R103.2 Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.~~

~~**R103.3 Examination of documents.** The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.~~

~~**R103.3.1 Approval of construction documents.** When the *code official* issues a permit where construction documents are required, the construction documents shall be endorsed in writing and stamped “Reviewed for Code Compliance.” Such *approved* construction documents shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved* construction documents.~~

~~One set of construction documents so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.~~

~~**R103.3.2 Previous approvals.** This code shall not require changes in the construction documents, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.~~

~~**R103.3.3 Phased approval.** The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the construction documents for the entire system have been submitted or *approved*, provided adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.~~

~~**R103.4 Amended construction documents.** Changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.~~

~~**R103.5 Retention of construction documents.** One set of *approved* construction documents shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.~~

~~SECTION R104~~
~~INSPECTIONS~~

~~**R104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

~~**R104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

~~**R104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

~~**R104.4 Reinspection.** A building shall be reinspected when determined necessary by the *code official*.~~

~~**R104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

~~**R104.6 Inspection requests.** It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.~~

~~**R104.7 Reinspection and testing.** Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.~~

~~**R104.8 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**R104.8.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~

~~SECTION R105~~
~~VALIDITY~~

~~**R105.1 General.** If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.~~

~~SECTION R106~~
~~REFERENCED STANDARDS~~

~~**R106.1 Referenced codes and standards.** The codes and standards referenced in this code shall be those listed in Chapter 5, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections R106.1.1 and R106.1.2.~~

~~**R106.1.1 Conflicts**. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.~~

~~**R106.1.2 Provisions in referenced codes and standards.** Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.~~

~~**R106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

~~**R106.3 Application of references.** References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.~~

~~**R106.4 Other laws.** The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.~~

~~SECTION R107~~
~~FEES~~

~~**R107.1 Fees.** A permit shall not be issued until the fees prescribed in Section R107.2 have been paid, nor shall an amendment to a permit be released until the additional fee, if any, has been paid.~~

~~**R107.2 Schedule of permit fees.** A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.~~

~~**R107.3 Work commencing before permit issuance.** Any person who commences any work before obtaining the necessary permits shall be subject to an additional fee established by the *code official*, which shall be in addition to the required permit fees.~~

~~**R107.4 Related fees.** The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.~~

~~**R107.5 Refunds.** The *code official* is authorized to establish a refund policy.~~

~~SECTION R108~~
~~STOP WORK ORDER~~

~~**R108.1 Authority.** Whenever the *code official* finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the *code official* is authorized to issue a stop work order.~~

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

~~**R108.3 Emergencies.** Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.~~

~~**R108.4 Failure to comply.** Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than **[AMOUNT]** dollars or more than **[AMOUNT]** dollars.~~

~~**SECTION R109**~~
~~**BOARD OF APPEALS**~~

~~**R109.1 General.** In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *code official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.~~

~~**R109.2 Limitations on authority.** An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.~~

~~**R109.3 Qualifications.** The board of appeals shall consist of members who are qualified by experience and training and are not employees of the jurisdiction.~~

Commenter's Reason: As Chief Sustainability Officer of the New York City Department of Buildings from 2002-12, and having written the legislation and administrative provisions for the New York City Energy Conservation Code, I believe having two different sets of administrative provisions, where both commercial and residential applications are significant in number, is cumbersome to use, in practice – particularly as they diverge over several cycles, in volume, in cost; and they result in a waste of paper throughout the publication and printing of this code. In order to acknowledge where the smaller scale of residential homes may benefit from some adjustment in language or procedure, I propose highlighting this in the specific section, but making it clear also where residential and commercial codes are identical. If, farther down the line, code officials find due to many significant differences that they prefer to have actually two different chapters, then that split can occur at that time. But in the end, administrative and enforcement procedures are simpler if they are consistent for residential and commercial buildings – this applies for both practitioners and code officials.

CE1-13, Part II

Final Action: AS AM AMPC____ D

CE2-13, Part I
C101.3, R101.3 (N1101.2)

Proposed Change as Submitted

Proponent: William W Stewart, FAIA, PE, representing self (codedoc@sbcglobal.net)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.3 Intent. This code shall regulate the design and construction of buildings for the ~~effective~~ use and conservation of energy over the ~~useful~~ life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

Reason: The deleted words are subjective and add nothing to the code. The "effective" use of energy is neither definable or enforceable. What is effective to some is not effective to others. No where in the code is the "useful" life of a building defined and it depends of the needs of the occupant. Is a building designed with cutting edge technology no longer useful when a higher level if technology is applied to newer buildings? Additionally, a remodeled building could have a longer "useful" life than anticipated by the original owner. As revised, the code would be understandable and enforceable.

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

C101.3-CE-STEWART.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal removes subjective terms from the code that do not provide guidance in use and application of the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing Energy Efficient Codes Coalition, Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

Commenter's Reason: We recommend approval of CE2 Part I, as modified by this public comment. We do not object to removal of the word "useful" as set forth in the original proposal, but we do object to removal of the word "effective." The term "effective use of energy" has been part of every edition of this energy code since (at least) the 1992 Model Energy Code, without causing any problems. It does not make sense to simply reference the "use and conservation of energy" without clarifying that the purpose of the code is to regulate the effective use of energy through design and construction.

CE2-13, Part I
Final Action: AS AM AMPC____ D

CE2-13, Part II
C101.3, R101.3 (N1101.2)

Proposed Change as Submitted

Proponent: William W Stewart, FAIA, PE, representing self (codedoc@sbcglobal.net)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.3 (N1101.2) Intent. This code shall regulate the design and construction of buildings for the ~~effective~~ use and conservation of energy over the ~~useful~~ life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

Reason: The deleted words are subjective and add nothing to the code. The "effective" use of energy is neither definable or enforceable. What is effective to some is not effective to others. No where in the code is the "useful" life of a building defined and it depends of the needs of the occupant. Is a building designed with cutting edge technology no longer useful when a higher level if technology is applied to newer buildings? Additionally, a remodeled building could have a longer "useful" life than anticipated by the original owner. As revised, the code would be understandable and enforceable.

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

C101.3-CE-STEWART.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: The proposal appropriately removes a subjective term.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R101.3 (N1101.2) Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

Commenter's Reason: We recommend approval of CE2 Part II, as modified by this public comment. We do not object to removal of the word "useful" as set forth in the original proposal, but we do object to removal of the word "effective." The term "effective use of energy" has been part of every edition of this energy code since (at least) the 1992 Model Energy Code, without causing any problems. It does not make sense to simply reference the "use and conservation of energy" without clarifying that the purpose of the code is to regulate the effective use of energy through design and construction.

CE2-13, Part II

Final Action: AS AM AMPC____ D

CE4-13, Part I
C101.4.1 through C101.4.5, C202, C401.2.1, Chapter 5 (CE) (NEW), R101.4, R202 (IRC N1101.9); R402.3.6 (IRC N1102.3.6), Chapter 5 (RE) (NEW) (IRC N1106 (NEW))

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Delete without substitution as follows:

~~**C101.4.1 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**C101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**C101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

~~**C101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.~~

~~**C101.4.5 Change in space conditioning.** Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.~~

Delete without substitution as follows:

~~**C401.2.1 Application to existing buildings.** Additions, alterations and repairs to existing buildings shall comply with one of the following:~~

1. ~~Sections C402, C403, C404 and C405; or~~
2. ~~ANSI/ASHRAE/IESNA 90.1.~~

Add new text as follows:

CHAPTER 5 CE
EXISTING BUILDINGS

SECTION C501
GENERAL

C501.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures.

C501.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

C501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

C501.6 Historic buildings. *Historic buildings* are exempt from this code.

SECTION C502
ADDITIONS

C502.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

SECTION C503
ALTERATIONS

C503.1 General Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

C503.2 Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

SECTION C504
REPAIRS

C504.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. Roof repairs where neither the sheathing nor the insulation is exposed~~.~~
3. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.

4. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or C405.5.2 (2) to another use in Table C405.5.2(1) or C405.5.2 (2), the installed lighting wattage shall comply with Section C405.5.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Reason: (PART I) This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The primary purpose of this proposal is to move the regulation of existing buildings under the IECC out of Chapter 1 and into its own Chapter. Chapter 1 should be reserved for administrative provisions of the code and not the technical standards applicable to renovating or expanding existing buildings. For the Commercial IECC there are additional provisions for existing buildings found in Section C401.2.1. Therefore the primary purpose is editorial. But the purpose is also forward looking. The vast majority of our building stock is existing. If more energy savings is to be found, a significant route is the upgrade of existing buildings. This change anticipates a growth in detail of such provisions, and the SEHPCAC fells that having a distinct existing buildings chapter will better accommodate the growth of such standards.

The committee used the general format of Chapter 34 of the IBC. It compared existing language in the IBC with that in the IECC and either chose language from one code or the other, or occasionally melded the two codes. The following table lists for each new section the source of the text.

Proposed Chapter Sections	Source code and Section
C501.1 Scope	IBC 3401.1
C501.2 Existing Buildings	IECC C101.4.1
C501.3 Maintenance	IBC 3401.2
C501.4 Compliance	IBC 3401.3
C501.5 New and replacement materials	IBC 3401.4
C501.6 Historic buildings	IECC C101.4.2
C502, Additions C502.1 General	IECC C101.4.3
C502.1 – General exception	IECC C401.2.1
C503 Alterations C503.1 General	IBC 3404.1 and IECC CC101.4.3
C503.2 Change in space conditioning	IECC 101.4.5
C504 Repairs C504.1 General	IBC 3405.1 IECC C101.4.3
C504.2 Application	IECC C101.4.3
C505 Change of Occupancy or Use C505.1 General	IECC C101.4.4

The proposal does simplify the language of the historic building section to a simple exemption, but at the same time proposes a definition Historic Buildings to be added to the IECC. Most of the current text of Section C101.4.2 is actually definition. The Committee noted that there is a difference between the definitions of historic buildings in the IBC versus the IEBC. It chose the IBC version, for consistency with the lead code. The IRC does not define historic buildings.
Another substantive change – or perhaps clarification is regarding a potential of a low energy space becoming a fully conditioned space. The current text of the IECC does not address such a conversion. This proposal treats such changes the same as that of creating a conditioned space from a non-conditioned space.

Section C101.4.3 includes a list of 8 actions which are exempt from compliance with the code. Since C101.4.3 addresses all three actions (additions, alterations and repairs) it is unclear where the 8 exceptions applies. The Committee reviewed each and felt that 4 belonged in the alteration section and 4 in the repairs section.

Finally the provisions currently found in Section 401.2.1 allowing the use of ASHRAE 90.1 is translated into an alternate compliance path. for additions in Section C502. The assumption is that the design of an addition can comply with the IECC or the ASHRAE 90.1 regardless of the requirements applied to the original building. For Alterations a similar exception is provided allowing use of either IECC or ASHRAE 90.1. These are simply shown as text allowing alternate compliance and not exception. The term exception implies a lesser standard; ASHRAE 90.1 should not be viewed as a lesser standard. However for repairs, the proposal only allows use of ASHRAE 90.1 for repairs if the original design was per ASHRAE 90.1.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is an editorial relocation of existing text. There will be no impact on the cost of construction.

CHAPTER 5 (NEW)-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Modified

Modify the proposal as follows:

REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance~~.

(Portions of the code change not shown remain unchanged.)

Committee Reason: The proposal makes the existing building provisions of the IECC easier to use. It provides a future platform for other existing building provisions by allowing them to be in one place in the code rather than scattered in multiple locations. There was discussion that proposed Section C501.3 Maintenance did not belong in the IECC based on a lack of specific existing text requiring maintenance. The Committee modified the definition of repair because it felt the added text was not needed because it was simply adding a reason for 'repair'.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's ~~designated~~ <u>authorized</u> agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This modification makes these 2 sections of the IECC consistent with ADM22-13, all 5 parts of which were approved as submitted at the Committee Action Hearings. ADM22 consistently replaced "designated agent" with "authorized agent" throughout the International Codes.

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

REPAIR. The reconstruction or renewal of any part of an existing building <u>for the purpose of its maintenance</u> <u>or to correct damage</u>.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This modification makes the IECC-Commercial language identical to the definition of "repair" approved for almost all the codes in ADM60-13. (The proposal was disapproved by the ISPSC Committee; a public comment is submitted asking for approval.) Part IV of ADM60 revised the definition in the residential portion of the IECC so without this modification, the definition will be different in IECC-Commercial as compared to IECC-Residential.

As approved by the IECC-CE Committee, a "repair" is indistinguishable from an alteration. Alteration is defined in part as "Any construction or renovation to an existing structure…" How would a code official or building owner distinguish "construction or renovation" which is alteration, from "reconstruction" which is repair? The purpose of the proposed work is the only way to make a reasonable distinction between alteration and repair. The pertinent code provisions support this conclusion. Other parts of CE4 create a separate section for repairs, Section C504, which states "Work on nondamaged components that is necessary for the required *repair* of damaged components…" Note that repair of damage is explicitly included in this provision.

CE4-13, Part I

Final Action: AS AM AMPC____ D

CE4-13, Part II

C101.4.1 through C101.4.5, C202, C401.2.1, Chapter 5 (CE) (NEW), R101.4, R202 (IRC N1101.9); R402.3.6 (IRC N1102.3.6), Chapter 5 (RE) (NEW) (IRC N1106 (NEW))

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC – RESIDENTIAL PROVISIONS

Revise as follows:

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

~~**R101.4.1 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**R101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**R101.4.3 (N1101.3) Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~

6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

~~**R101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.~~

~~**R101.4.5 (N1101.4) Change in space conditioning.** Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.~~

~~R101.4.6~~ R101.4.1 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of the IECC—Commercial and Residential Provisions.

Delete without substitution as follows:

~~**R402.3.6 (N1102.3.6) Replacement fenestration .** Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.~~

Add new text as follows:

CHAPTER 5 (RE)
EXISTING BUILDINGS

SECTION R501 (N1106)
GENERAL

R501.1 (N1106.1) Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures.

R501.2 (N1106.2) Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

R501.3 (N1106.3) Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

R501.4 (N1106.4) Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Residential Code, International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

R501.5 (N1106.5) New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

R501.6 (N1106.6) Historic buildings. *Historic buildings* are exempt from this code.

SECTION R502 (N1107)
ADDITIONS

R502.1 (N1107.1) General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

SECTION R503 (N1108)
ALTERATIONS

R503.1 (N1108.1) Alterations. *Alterations* to any building or structure shall comply with the requirements of the code for new construction. *Alterations* shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the *alteration*. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

R503.2 (N1108.2) Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

R503.3. (N1108.3) Replacement fenestration . Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.

SECTION R504 (N1109)
REPAIRS

R504.1 (N1109.1) General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

R504.2 (N1109.2) Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.

2. Roof repairs where neither the sheathing nor the insulation is exposed.
3. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION R505 (N1110)
CHANGE OF OCCUPANCY OR USE

R505.1 (N1110.1) General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

(PART II): This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

See the Reason statement for Part I of this proposal.

When the IECC was divided into two parallel documents, the provisions for existing buildings were copied nearly word for word into both C104 and R104. Therefore the IECC residential proposal mirrors the IECC Commercial proposal with 3 distinct differences.

1. ASHRAE 90.1 is not address as the standard is not applicable to 'residential' buildings.
2. Section R402.3.6 on replacement fenestration is added as it only applies to residential.
3. What is Item 3 in Section C504.2 does not appear in the residential version. This Item addresses maintaining door vestibules and/or revolving doors where such doors separate conditioned from non-conditioned space. Vestibules are a requirement in the IECC Commercial new construction provisions – but are not found in the residential. Therefore requiring maintenance under the residential provisions is inappropriate.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is an editorial relocation of existing text. There will be no impact on the cost of construction.

CHAPTER 5 (NEW)-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal creates a needed framework for energy conservation requirements for existing buildings. This consolidates all existing building requirements in a single location and provides a framework for future development of regulations for existing buildings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance~~.

(Portions of the code change proposal not shown remain unchanged.)

Commenter's Reason: At the Dallas hearings there were several Part I and Part II proposals that rendered different results because of the different committees hearing them. While it is understandable that in rare instances it is ok to have results be different for commercial verses residential, many of these items need to have the same requirement for both applications and we feel that this is one of those items.

We agree that it will be easier to just move a lot of the existing building provisions to their own chapter so that the scope and applicability can be addressed more fully and consistently than having separate requirements mixed throughout chapters 1-4, but feel that the requirements should be the same for commercial and residential buildings. The modification made by the commercial committee for Part I was an improvement to the original proposal and we would request that modification replace the submitted language for the residential provisions in Part II, siting additionally the committee's reason for approval.

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R501.3 (N1106.3) Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's ~~designated~~ <u>authorized</u> agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

(Portions of the code change proposal not shown remain unchanged.)

Commenter's Reason: This modification makes these 2 sections of the IECC consistent with ADM22-13, all 5 parts of which were approved as submitted at the Committee Action Hearings. ADM22 consistently replaced "designated agent" with "authorized agent" throughout the International Codes.

CE4-13, Part II

Final Action: AS AM AMPC____ D

CE5-13
C202, C101.4.3, C409 (NEW)

Proposed Change as Submitted

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Delete and substitute as follows:

~~**C101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

C101.4.3 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section C409.

Add new text as follows:

SECTION C409
ADDITIONS, ALTERATIONS, OR REPAIRS

C409.1 Scope. The provisions of this chapter shall control the *alteration*, *repair,* and *addition* of existing buildings and structures for compliance with the *International Energy Conservation Code*.

C409.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration,* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C409.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and/or systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C409.4 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system, or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building supply system to comply with this code. Additions, alterations, or repairs shall not create an unsafe or hazardous condition or overload existing building systems.

C409.4.1 Additions. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply as a single building. Additions shall comply with Section C409.4.1.1.

> **Exception:** Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.

C409.4.1.1 Prescriptive compliance. Additions shall comply with Sections C409.4.1.1.1 through C409.4.1.1.5.

C409.4.1.1.1 Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections C402.1 through C402.4.

C409.4.1.1.1.1 Vertical Fenestration. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407 or ASHRAE 90.1.

C409.4.1.1.1.2 Skylight area. New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407 or ASHRAE 90.1.

C409.4.1.1.2 Building mechanical systems. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.

C409.4.1.1.3 Service water heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C409.4.1.1.4 Pools and inground permanently installed spas. New pools and inground permanently installed spas shall comply with Section C404.7.

C409.4.1.1.5 Electrical power and lighting systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C409.4.1.1.5.1 Interior lighting power. The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building and the addition complies as a single building.

C409.4.1.1.5.2 Exterior lighting power. The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building and the addition complies as a single building.

C409.4.2 Alterations. Alterations to existing buildings shall comply with Section C409.4.2.1 through C409.4.2.4. *Alterations* shall be such that the existing building or structure is no less complying with the provisions of this code than the existing building or structure was prior to the *alteration*.

> **Exception:** Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.

C409.4.2.1 Building envelope. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.4.

C409.4.2.1.1 Vertical Fenestration. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C405.2.2.3.2 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407 or ASHRAE 90.1.

C409.4.2.1.2 Skylight area. The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407 or ASHRAE 90.1.

> **Exceptions:** The following building envelope alterations are exempt from Section C409.4.2.1.
>
> 1. Storm windows installed over existing fenestration.
> 2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
> 3. Construction where the existing roof, wall or floor cavity is not exposed.

C409.4.2.2 Heating and cooling systems. New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403.

C409.4.2.2.1 Economizers. New cooling systems that are part of alteration shall comply with section C403.3.1 or C403.4.1.

C409.4.2.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section C404.

C409.4.2.4 Lighting. New lighting systems that are part of the alteration shall comply with Section C405.

> **Exceptions.**
>
> 1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
> 2. Alterations that replace on the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

C409.4.3 Repairs. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C409.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C409.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section. Where a building was constructed to comply with

ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

Exceptions: The following alterations are exempt from Section C409.4.3.

1. Glass only replacements in an existing sash and frame this is a repair.
2. Reroofing for roofs where neither the sheathing nor the insulation is exposed this is a repair.

Revise definition as follows:

IECC SECTION C202
GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Reason: The commercial provisions of the 2012 IECC require that additions, alterations, renovations, or repairs comply with the provisions of the energy code without providing a clear "roadmap" on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

This proposal places all of the requirements for additions, alterations, renovations, and repairs into a new section in the commercial provisions of the IECC and builds off the work conducted by the ICC SEHPCAC in the development of their existing building proposal. The additions portion of the proposal provides direction on what options are available for demonstrating compliance for projects up to 30% window to wall ratio and for those projects up to 40% window to wall ratio. References into the code are also provided when HVAC, water heating, and lighting systems are included in the project. The alteration portion of the proposal provides clear guidance on how to address alterations that increase fenestration area for the building that exceeds the prescriptive fenestration limits for the building as defined in the code. Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, HVAC, or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

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

C409 (NEW)-EC-MAKELA.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There was initial support of this proposal by the committee. They saw this as complimentary to the action taken to approve CE4-13 to create a new Existing Buildings chapter, with the elements of CE5 being added to provide additional guidance. The committee made modifications to the definition of repair as made in CE4 and also modified the proposal to remove the provisions on maintenance. Further modifications were discussed, but the committee felt that it would be better to address multiple modifications by public comment how CE5 would meld with CE4. There was also concern that ASHRAE 90.1 should not be referenced as a option within the existing building provisions, but that these provisions should stand on their own.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Name: Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Revise as follows:

~~**REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.~~

~~**Section C101.4.3 Additions, alterations, or repairs.** Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section C409.~~

~~**SECTION C409**~~
~~**ADDITIONS, ALTERATIONS, OR REPAIRS**~~

~~**C409.1 Scope.** The provisions of this chapter shall control the *alteration*, *repair,* and *addition* of existing buildings and structures for compliance with the IECC.~~

~~**C409.2 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration,* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**C409.3 Maintenance.** Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and/or systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.~~

~~**C409.4 Additions, alterations, or repairs**~~ **C502.1 General.** Additions~~, alterations, or repairs~~ to an existing building, building system, or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion~~(s)~~ of the existing building or building~~ supply~~ system to comply with this code. An ~~A~~additions~~, alterations, or repairs~~ shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. Additions shall comply with Section C502.2.

~~**C409.4.1 Additions**. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply as a single building. Additions shall meet the specific requirements in Section C409.4.1.1.~~

> ~~**Exception:** Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.~~

~~**C409.4.1.1**~~ **C505.2 Prescriptive compliance.** Additions shall comply with Section C402 and Sections ~~C409.4.1.1.1 to C409.4.1.1.5~~ C502.2.1 through C502.2.6.2 when applicable.

~~**C409.4.1.1.1 Building envelope**. New building envelope assemblies that are part of the addition shall comply with Sections C402.1 to C402.4.~~

~~**C409.4.1.1.1.1**~~ **C502.2.1 Vertical Fenestration**. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**C409.4.1.1.1.2**~~ **C502.2.2 Skylight area.** New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**C409.4.1.1.2**~~ **C502.2.3 Building mechanical systems**. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.

~~**C409.4.1.1.3**~~ **C502.2.4 Service water heating systems.** New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

~~**C409.4.1.1.4**~~ **C502.2.5 Pools and inground permanently installed spas**. New pools and inground permanently installed spas shall comply with Section C404.7.

~~**C409.4.1.1.5**~~ **C502.2.6 Electrical power and lighting systems.** New lighting systems that are installed as part of the addition shall comply with Section C405.

~~**C409.4.1.1.5.1**~~ **C502.2.6.1 Interior lighting power.** The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building plus the addition complies as a single building.

~~**C409.4.1.1.5.2**~~ **C502.2.6.2 Exterior lighting power.** The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building plus the addition complies as a single building.

~~**C409.4.2 Alterations.** Alterations to existing buildings shall comply with Section C409.4.2.1 to C409.4.2.4. *Alterations* shall be such that the existing building or structure is no less complying with the provisions of this code than the existing building or structure was prior to the *alteration*.~~

~~**Exception:** Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.~~

~~**C409.4.2.1**~~ **C503.2.1 Building envelope**. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 to C402.4 as applicable.

~~**C409.4.2.1.1**~~ **C503.2.1.1 Vertical Fenestration**. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C405.2.2.3.2 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**C409.4.2.1.2**~~ **C503.2.1.2 Skylight area.** The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**Exceptions:** The following building envelope alterations are exempt from Section C409.4.2.1.~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
3. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~

~~**C409.4.2.2**~~ **C503.2.2 Heating and cooling systems.** New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403 as applicable.

~~**C409.4.2.2.1**~~ **C503.2.2.1 Economizers.** New cooling systems that are part of alteration shall comply with Section C403.3.1 or C403.4.1, as applicable.

~~**C409.4.2.3**~~ **C503.2.3 Service hot water systems**. New service hot water systems that are part of the alteration shall comply with Section C404, as applicable.

~~**C409.4.2.4**~~ **C503.2.4 Lighting.** New lighting systems that are part of the alteration shall comply with Section C405 as applicable.

Exceptions.

1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
2. ~~Alterations that replace on the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.~~

~~**C409.4.3 Repairs.** Buildings and structures, and parts thereof, shall be repaired in compliance with Section C409.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section. Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.~~

~~**Exceptions:** The following alterations are exempt from Section C409.4.3.~~

~~1. Glass only replacements in an existing sash and frame this is a repair.~~
~~2. Reroofing for roofs where neither the sheathing nor the insulation is exposed this is a repair.~~

Commenter's Reason: The IECC Code Development Committee saw CE5 as complementary to CE4 that was approved as modified. CE4 provided the framework for a new chapter in the IECC and CE5 provided guidance necessary to determine compliance for additions, alterations and repairs. There was initial support on CE5 except for two primary issues that the committee felt were best addressed through the Public Comment process. The main issues focused on the definition of repair and also to the number of references to ASHRAE 90.1.

This Public Comment modifies the format and language in CE5 so it can merge seamlessly into CE4. The end result is the format from CE4 with the guidance provided in CE5 to increase the understanding on how to demonstrate compliance for additions, alterations and repairs. The two code change proposals have been merged together at the end of this reason statement to demonstrate how the finished code will appear in the 2015 IECC if approved.

The commercial provisions of the 2012 IECC require that additions, alterations, renovations, or repairs comply with the provisions of the energy code without providing a clear "roadmap" on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

The additions portion of the proposal provides direction on what options are available for demonstrating compliance for projects up to 30% window to wall ratio and for those projects up to 40% window to wall ratio. References into the code are also provided when HVAC, water heating, and lighting systems are included in the project. The alteration portion of the proposal provides clear guidance on how to address alterations that increase fenestration area for the building that exceeds the prescriptive fenestration limits for the building as defined in the code. Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, HVAC, or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

The following code text will be published in the 2015 IECC if this public comment is approved. The underlined areas show where the CE5 language fits into the CE4 code change proposal.

CHAPTER 5 CE
EXISTING BUILDINGS
SECTION C501
GENERAL

C501.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures.

C501.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

C501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

C501.6 Historic buildings. *Historic buildings* are exempt from this code.

SECTION C502
ADDITIONS

C502.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. <u>Additions shall comply with Section C502.2.</u>

Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

<u>**C502.2 Prescriptive compliance.** Additions shall comply with Sections C502.2.1 through C502.2.6.2.</u>

<u>**C502.2.1 Vertical Fenestration**. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that result in a total building fenestration area greater than C402.3.1, or additions that exceed the fenestration area greater than C402.3.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407.</u>

<u>**C502.2.2 Skylight area.** New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3.1, or additions that exceed the skylight area shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407.</u>

C502.2.3 Building mechanical systems. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.

C502.2.4 Service water heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C502.2.5 Pools and inground permanently installed spas. New pools and inground permanently installed spas shall comply with Section C404.7.

C502.2.6 Electrical power and lighting systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C502.2.6.1 Interior lighting power. The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building and the addition complies as a single building.

C502.2.6.2 Exterior lighting power. The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building and the addition complies as a single building.

SECTION C503
ALTERATIONS

C503.1 General Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

C503.2 Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

C503.2.1 Building envelope. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.4.

C503.2.1.1 Vertical Fenestration. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.3.1 shall comply with Section C402.3.1.1 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407.

C503.2.1.2 Skylight area. The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3.1 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407.

C503.2.2 Heating and cooling systems. New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403.

C503.2.2.1 Economizers. New cooling systems that are part of alteration shall comply with section C403.3.1 or C403.4.1.

C503.2.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section C404.

C503.2.4 Lighting. New lighting systems that are part of the alteration shall comply with Section C405.

Exceptions.

1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

SECTION C504
REPAIRS

C504.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. Roof repairs where neither the sheathing nor the insulation is exposed.
3. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
4. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or C405.5.2 (2) to another use in Table C405.5.2(1) or C405.5.2 (2), the installed lighting wattage shall comply with Section C405.5.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building.

CE5-13
Final Action: AS AM AMPC____ D

CE7-13, Part I
C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

Proposed Change as Submitted

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Ric Cochrane, National Trust for Historic Preservation, David Collins, The Preview Group representing The American Institute of Architects

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~ The provisions of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall not be mandatory for *historic buildings*. No provision of this code shall be used to require the *alteration* of an *historic building*.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: The current language for Historic Buildings in the IECC-Commercial, the IECC-Residential and the IEBC is confusing, inconsistent with I-Code conventions for definitions, and does not clearly describe how buildings and districts are listed or determined to be eligible to be listed as historic. The charging language in C101.4.2 contains no fewer than three semi-colons and nine instances of the word "or". This makes the language very difficult to parse. The sentence structure in the current language that addresses eligibility is confusing and obfuscates who does the determinations.

The IECC mixes the definition of "historic building" with the charging language for historic buildings. Not only does this further make the charging language difficult to understand, it makes the language inconsistent with the way the I-Codes deal with definitions. Generally, the I-Codes keep definitions out of the code language and gather all definitions together into a definitions section.

Finally, the language does not align with how buildings and districts are officially designated by the governing authorities as eligible for listing as historic.

This proposal solves these three problems. First, it moves the definition of an historic building to the definitions sections in the IECC and edits the charging language of C101.4.2 to simply refer to that definition. It remedies the confusion caused by the sheer complexity of the defining language by converting the running list of qualifications into a clearly delineated numbered list. Finally, the proposal gives the language clarity and specificity as to how a building is officially determined to be eligible for the various lists of historic buildings. In accordance with the Code of Federal Regulations, Title 36, Chapter I, Part 63, determinations of eligibility for listing in the National Register of Historic Places are made by State Historic Preservation Offices in coordination with the Keeper of the National Register of Historic Places. This is an official process conducted in accordance with federal standards. This proposal aligns the code language with the language of this official process and removes any ambiguity as to who can make determinations of eligibility.

The charging language in the IECC also creates a rather large loophole. Historic buildings as defined by Section C101.4.1 are exempted completely from the code in its entirety. This means that no work being done on an historic building has to comply with the IECC at all - not alterations, not changes of use, not even additions. The definition of "historic building" is rather broad. It includes buildings that are certified as contributing to a local, state or national historic district. These are buildings that generally do not have enough historical significance/character to merit designation on their own, but do have enough to help define the overall significance/character of a district. Yet they are completely exempted from the energy code.

Buildings with historic significance may have social and aesthetic values, and the energy code should not be written in a way that will degrade these values. But rather than wholly exempting historic buildings like the current language in the IECC does, other I-Codes, especially the IBC and IFC, have balanced the protection of historic buildings with the intended goals of the codes. The IECC should follow this example and balance the competing values of historic preservation and energy conservation, rather than granting a wholesale exemption to historic buildings.

This proposal narrows the historic building loophole by eliminating the most egregious part, the exemption for additions to historic buildings. Additions to historic buildings are new construction, and in this case there is no historic character or historic fabric to protect. This change will make additions subject to the provisions of the IECC. However, it ensures that only the addition is subject to the IECC and exempts the historic building itself from any requirements that might be triggered by the addition.

This proposal is one of four proposals in Cycle B to create this consistency for Historic Buildings across the I-codes. The other three proposals are being made to the IECC-Commercial, the IEBC and the IPMC.

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

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

> **Historic buildings.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

> **Historical Building.** Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

These proponents have submitted proposals to add this definition to the *International Property Maintenance Code* (PM2-13) and to the *International Existing Buildings Code* (EB1-13)

C101.4.2-EC- COCHRANE-COLLINS-EDELSON .docm.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Modified

Modify the proposal as follows:

C101.4.2 Historic buildings. The provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings. ~~No provision of this code shall be used to require the alteration of an historic building~~.

Section 202

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places;
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed, <u>state designated,</u> or locally designated historic district.

Committee Reason: The revision provides a better format by providing an inclusive definition of historic buildings in Section 202 - definitions and then leaves the regulation of those historic buildings in active provisions of the code. The definition was modified to clarify that a historic district could also be created by a state in additional to a National or local designation. The second sentence of C101.4.2 was deleted because it was retained in CE4-13 and didn't need to be repeated in this section.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Edelson, New Buildings Institute, Lee Kranz, Washington Association of Building Officials, David Collins, American Institute of Architects, Ryan Meres, Institute for Market Transformation, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C101.4.2 Historic buildings. ~~The~~ No provisions of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall ~~not~~ be mandatory for *historic buildings* provided a report has been submitted to the code official and signed by a *registered design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the *building*.

Commenter's Reason: Two different committees heard the residential and commercial portions of the IECC. The two committees took different action on R and C Section 101.4.2, the charging language for historic buildings. The Residential committee approved CE8(II)-13 and the Commercial committee approved CE7(I)-13. These disparate actions leave the IECC with inconsistent approaches to Historic Buildings.

CE7(I&II) restructured the historic building definition and requirement for clarity, but did little to narrow the historic building exemption. CE8(I&II) restructured for clarity, but also narrowed the exemption through only exempting historic buildings from provisions that would "compromise the historic nature and function of the building." Both committees liked the idea of narrowing the Historic Buildings exemption. The Residential committee preferred CE8 as a reasonable way to limit the missed opportunity for energy savings the historic buildings exemption creates. However, the Commercial committee heard much more testimony and came to a different conclusion. By default, CE8 leaves the determination of impact on the historic building up to the building official, even though the building department is not the agency authorized by most preservation legislation to designate historic buildings or make determinations about impact on historic buildings. The committee heard testimony from preservationists about the problems of making the building department responsible for this determination, and even discussed among themselves about the difficulties for building officials. Though the Commercial committee liked the idea of reasonably narrowing the exemption, they preferred CE7 because of the implications of enforcement of CE8.

The proponents of CE7 and CE8 have come together to submit joint comments to reconcile the two approaches, bring consistency to the residential and commercial sections of the IECC, and address the concerns of the Commercial Committee. Unlike CE7 this approach narrows the exemption for historic buildings in the IECC; however, it does not require the building official to make a determination of impact as in CE8. It hinges exemption on the submission of a report detailing how the provision would damage the historic significance of the building. The report mechanism is already a part of the I-Codes; it is utilized in the IEBC (Section 1101.2 Report) to deal with historic buildings unable to comply with accessibility provisions without harming the integrity of the historic building. A report is only required for **non-compliance** with code provisions; any work in compliance with IECC provisions would not require a report. The comment provides three options for a report signatory, the architect, the State Historic Preservation Office (SHPO) or the local preservation authority, providing both flexibility and reliability for the reporting requirement. The building official simply has to receive the report, but the creation of the report requires the project to substantiate the need for exemption from a given provision of the IECC.

This comment is being submitted to CE7(I), which prevailed in the Commercial section. Another corresponding comment is being submitted to CE8(II), which prevailed in the Residential section.

CE7-13, Part I

Final Action: AS AM AMPC____ D

CE7-13, Part II

C101.4.2, C202 (New), R101.4.2, R202 (New) (IRC N1101.9 (New))

Proposed Change as Submitted

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Ric Cochrane, National Trust for Historic Preservation, David Collins, The Preview Group representing The American Institute of Architects

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~ The provisions of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall not be mandatory for *historic buildings*. No provision of this code shall be used to require the *alteration* of an *historic building*.

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: The current language for Historic Buildings in the IECC-Commercial, the IECC-Residential and the IEBC is confusing, inconsistent with I-Code conventions for definitions, and does not clearly describe how buildings and districts are listed or determined to be eligible to be listed as historic. The charging language in C101.4.2 contains no fewer than three semi-colons and nine instances of the word "or". This makes the language very difficult to parse. The sentence structure in the current language that addresses eligibility is confusing and obfuscates who does the determinations.

The IECC mixes the definition of "historic building" with the charging language for historic buildings. Not only does this further make the charging language difficult to understand, it makes the language inconsistent with the way the I-Codes deal with definitions. Generally, the I-Codes keep definitions out of the code language and gather all definitions together into a definitions section.

Finally, the language does not align with how buildings and districts are officially designated by the governing authorities as eligible for listing as historic.

This proposal solves these three problems. First, it moves the definition of an historic building to the definitions sections in the IECC and edits the charging language of C101.4.2 to simply refer to that definition. It remedies the confusion caused by the sheer complexity of the defining language by converting the running list of qualifications into a clearly delineated numbered list. Finally, the proposal gives the language clarity and specificity as to how a building is officially determined to be eligible for the various lists of historic buildings. In accordance with the Code of Federal Regulations, Title 36, Chapter I, Part 63, determinations of eligibility for listing in the National Register of Historic Places are made by State Historic Preservation Offices in coordination with the Keeper of the National Register of Historic Places. This is an official process conducted in accordance with federal standards. This proposal aligns the code language with the language of this official process and removes any ambiguity as to who can make determinations of eligibility.

The charging language in the IECC also creates a rather large loophole. Historic buildings as defined by Section C101.4.1 are exempted completely from the code in its entirety. This means that no work being done on an historic building has to comply with the IECC at all - not alterations, not changes of use, not even additions. The definition of "historic building" is rather broad. It includes buildings that are certified as contributing to a local, state or national historic district. These are buildings that generally do not have enough historical significance/character to merit designation on their own, but do have enough to help define the overall significance/character of a district. Yet they are completely exempted from the energy code.

Buildings with historic significance may have social and aesthetic values, and the energy code should not be written in a way that will degrade these values. But rather than wholly exempting historic buildings like the current language in the IECC does, other I-Codes, especially the IBC and IFC, have balanced the protection of historic buildings with the intended goals of the codes. The IECC should follow this example and balance the competing values of historic preservation and energy conservation, rather than granting a wholesale exemption to historic buildings.

This proposal narrows the historic building loophole by eliminating the most egregious part, the exemption for additions to historic buildings. Additions to historic buildings are new construction, and in this case there is no historic character or historic fabric to protect. This change will make additions subject to the provisions of the IECC. However, it ensures that only the addition is subject to the IECC and exempts the historic building itself from any requirements that might be triggered by the addition.

This proposal is one of four proposals in Cycle B to create this consistency for Historic Buildings across the I-codes. The other three proposals are being made to the IECC-Commercial, the IEBC and the IPMC.

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

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

> **Historic buildings.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

> **Historical Building.** Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

These proponents have submitted proposals to add this definition to the *International Property Maintenance Code* (PM2-13) and to the *International Existing Buildings Code* (EB1-13)

C101.4.2-EC- COCHRANE-COLLINS-EDELSON .docm.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The committee preferred other code change proposals submitted that deal with historic buildings. (Note: CE8 was approved as submitted.)

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Donald Vigneau, AIA, representing Northeast Energy Efficiency Partnerships, Inc, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R101.4.2 Historic buildings. The provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings. ~~No provision of this code shall be used to require the alteration of an historic building~~.

Section 202

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places;
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed, <u>state designated,</u> or locally designated historic district.

Commenter's Reason: This change proposal and CE-8-13 that follows both make changes to Historic Building definitions and requirements. CE7-13 however is far more preferable, as it is consistent with the applicable requirements in IBC Section 3409.1. The CE-7 proposal is also a far clearer and usable definition and set of provisions than CE-8, and should remain the consistent wording for definition and requirements within the IBC and the Residential and Commercial Energy Codes.

A corresponding Public Comment seeks to overturn the Residential Committee AS of CE 8-13 Part II to correlate this request.

CE7-13, Part II

Final Action: AS AM AMPC____ D

CE8-13, Part II
C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART I IS REPRODUCED ONLY FOR INFORMATION PURPOSES FOLLOWING ALL OF PART II.

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~ Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is:

1. Listed in the State or National Register of Historic Places
2. Designated as a historic property under local or state designation law or survey
3. Certified as a contributing resource within a National or State Register listed or locally designated historic district, or
4. Determined or certified by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places to be eligible to be listed in the State or National Register of Historic Places either individually or as a contributing resource in an historic district.

Reason: The existing requirement exempts historic buildings from all energy efficiency requirements, even those that do not impact the historic value of the building at all, such as lighting controls, attic insulation, or mechanical equipment efficiency. This modification requires energy efficiency measures only where they will leave the historic value of the building undisturbed.

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

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:
> **Historic buildings.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:
> **Historical Building.** Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the

National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

In addition to this proposal, definitions of historic building are proposed in CE7-13, CE9-13 being heard by this committee, PM2-13 being heard by the Property Maintenance Committee and EB1-13 being heard by the Existing Buildings Committee..

C101.4.2-EC-KRANZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This change will allow some increases in energy efficiency in historic buildings when the installation does not affect the historic nature of the building.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, Jim Edelson, New Buildings Institute, David Collins, American Institute of Architects, Ryan Meres, Institute for Market Transformation, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R101.4.2 Historic buildings. ~~Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.~~ No provision of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall be mandatory for *historic buildings* provided a report has been submitted to the code official and signed by the owner, a *registered design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the *building*.

Commenter's Reason: Two different committees heard the residential and commercial portions of the IECC. The two committees took different action on R and C Section 101.4.2, the charging language for historic buildings. The Residential committee approved CE8(II)-13 and the Commercial committee approved CE7(I)-13. These disparate actions leave the IECC with inconsistent approaches to Historic Buildings.

CE7(I&II) restructured the historic building definition and requirement for clarity, but did little to narrow the historic building exemption. CE8(I&II) restructured for clarity, but also narrowed the exemption through only exempting historic buildings from provisions that would "compromise the historic nature and function of the building." Both committees liked the idea of narrowing the Historic Buildings exemption. The Residential committee preferred CE8 as a reasonable way to limit the missed opportunity for energy savings the historic buildings exemption creates. However, the Commercial committee heard much more testimony and came to a different conclusion. By default, CE8 leaves the determination of impact on the historic building up to the building official, even though the building department is not the agency authorized by most preservation legislation to designate historic buildings or make determinations about impact on historic buildings. The committee heard testimony from preservationists about the problems of making the building department responsible for this determination. Though the Commercial committee liked the idea of reasonably narrowing the exemption, they preferred CE7 because of the implications of enforcement of CE8.

The proponents of CE7 and CE8 have come together to submit joint comments to reconcile the two approaches, bring consistency to the residential and commercial sections of the IECC, and address the concerns of the Commercial Committee. Unlike CE7 this approach narrows the exemption for historic buildings in the IECC; however, it does not require the building official to make a determination of impact as in CE8. It hinges exemption on the submission of a report detailing how the provision would damage the historic significance of the building. A report is only required for **non-compliance** with code provisions; any work in compliance with IECC provisions would not require a report. The comment provides four options for a report signatory, the architect, the State Historic Preservation Office (SHPO), the local preservation authority or the building owner. The building official simply has to receive the report, but the creation of the report requires the report signatory to substantiate the need for exemption from a given provision of the IECC.

The only difference between the residential and commercial proposals is that the owner can sign the report in the residential section. This reflects the reality that, unlike in commercial projects, a large portion of residential projects do not have an architect involved. Although it is good to have the SHPO or the local preservation commission available as options for signing the report, it could be problematic to make the large portion of residential projects without architects dependent on those organizations' capacity or willingness to participate in the codes process.

This comment is being submitted to CE8(II), which prevailed in the Residential section. Another corresponding comment is being submitted to CE7(I), which prevailed in the Commercial section.

Public Comment 2:

Donald Vigneau AIA, representing Northeast Energy Efficiency Partnerships, Inc., requests Disapproval.

Commenter's Reason: OVERTURN THE RESIDENTIAL ENERGY CODE COMMITTEE RECOMMENDATION FOR APPROVAL AS SUBMITTED AND DISAPPROVE PART II CONSISTENT WITH THE COMMERCIAL ENERGY CODE COMMITTEE ACTION. This change proposal and CE-7-13 that precedes it both make changes to Historic Building definitions and requirements. CE7-13 however is far more preferable, as it is consistent with the applicable requirements in IBC Section 3409.1. The CE-7 proposal is also a far clearer and usable definition and set of provisions than CE-8, and should remain the consistent wording for definition and requirements within the IBC and the Residential and Commercial Energy Codes.

A corresponding Public Comment seeks to overturn the Residential Committee Disapproval of CE 7-13 Part II to correlate this request.

CE8-13, Part II

Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE8-13

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. ~~Any buildings or structures that is are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state registers of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the national register of historic places, are exempt from this code.~~ Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is:

1. Listed in the State or National Register of Historic Places
2. Designated as a historic property under local or state designation law or survey
3. Certified as a contributing resource within a National or State Register listed or locally designated historic district, or
4. Determined or certified by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places to be eligible to be listed in the State or National Register of Historic Places either individually or as a contributing resource in an historic district.

Reason: The existing requirement exempts historic buildings from all energy efficiency requirements, even those that do not impact the historic value of the building at all, such as lighting controls, attic insulation, or mechanical equipment efficiency. This modification requires energy efficiency measures only where they will leave the historic value of the building undisturbed.

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

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

Historic buildings. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

Historical Building. Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

In addition to this proposal, definitions of historic building are proposed in CE7-13, CE9-13 being heard by this committee, PM2-13 being heard by the Property Maintenance Committee and EB1-13 being heard by the Existing Buildings Committee..

C101.4.2-EC-KRANZ.doc

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The committee preferred the action taken to approve CE7-13.

Assembly Action: **None**

CE12-13
C101.4.3, C202 (NEW)

Proposed Change as Submitted

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Replacement of existing *fenestration*, provided, however, that the area of the replacement *fenestration* does not exceed 25 percent of the total *fenestration area* of an existing building and that the *U-factor* and *SHGC* will be equal to or lower than before the *fenestration* replacement.

~~3~~ 4. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.

~~4~~5. Construction where the existing roof, wall or floor cavity is not exposed.

~~5~~6. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

~~6~~7. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,

~~7~~8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

~~8~~9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

FENESTRATION AREA. The total area of the fenestration measured using the rough opening and including the glazing, sash, and frame. For doors where the glazed vision area is less than 50 percent of the door area, the fenestration area is the glazed vision area. For all other doors, the fenestration area is the door area, using the rough opening and including the frame.

Reason: Currently when a portion of the fenestration in a store-front or curtain wall building is damaged the IECC requires the replacement fenestration to meet the requirements of the current code. Often times this requires additional construction to the undamaged portions of the fenestration to ensure the code compliant replacement is compatible.

This code change will allow replacement of damaged fenestration in existing buildings to be replaced without requiring the fenestration to meet the current U-factor and SHGC requirements when falling within certain parameters.

The damaged area needing replacement must not exceed 25% of the total fenestration of the building and it must be equal or better than currently installed.

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

C101.4.3-EC-ELLIS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was felt to be too broad and could be abused. While the proponent expressed a need to allow people to address damage to fenestration, the committee felt that existing exceptions addressed that need. The provision could allow someone to 'replace' 25% one month, 25% the next month and in short order could replace all the buildings fenestration.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shirley Ellis, Energy Systems Laboratory, representing Texas A & M University System, requests Approval as Submitted.

Commenter's Reason: Currently when a portion of the fenestration in a store-front or curtain wall building is damaged the IECC requires the replacement fenestration to meet the requirements of the current code, while the ANSI/ASHRAE/IESNA 90.1 allows an exception for replacement of 25% of the fenestration provided that the U-factor and SHGC will be equal to or lower than before the replacement. This exception brings into the IECC the exact language from the ANSI/ASHRAE/IESNA 90.1, thereby allowing the contractor the option of using the IECC or ANSI/ASHRAE/IESNA 90.1.

This code change will allow the use of the IECC provisions when making repairs to a building that include replacement of damaged fenestration. Without this exception many buildings needing repairs that include damages to fenestration revert to the ANSI/ASHRAE/IESNA 90.1 rather than the IECC. This choice is often due to the additional construction and increased costs for work to the undamaged portions of the structure associated with ensuring the code compliant replacement fenestration is compatible.

CE12-13

Final Action: AS AM AMPC____ D

CE15-13, Part I

C101.4.3, C202 (New), C402.2.1.1, R101.4.3 (IRC N1101.3), R202 (New) (IRC N1101.9 (New))

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED ONLY FOR INFORMATION PURPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

Proponents: Michael. D. Fischer, Kellen Company, representing Center for the Polyurethanes Industry (mfischer@kellencompany.com); Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association; Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed.~~ Roof recover or roof repair.
6. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
~~6~~7. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
~~7~~8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
~~8~~9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new text as follows:

C402.2.1.1 Roof replacement. For roof replacements, where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above deck, roof replacement shall include compliance with the requirements of Table C402.1.2 or Table C402.2.

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

[B] REROOFING. The process of recovering or replacing an existing *roof covering*. See "Roof recover" and "Roof replacement."

[B] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[B] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

[B] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

Reason: Fischer (Part I) The current requirements that govern envelope performance requirements during reroofing do not utilize definitions contained in the building codes. The use of the term reroofing in and of itself is overly broad and subject to confusion. Roof replacement, which is the specific condition intended for envelope compliance, provides an important opportunity to decrease building energy use in US buildings. This proposal provides needed clarity to ensure that buildings are evaluated for compliance to current energy code requirements when the roof is replaced. The proposal also improves the exception to ensure that roof repair and recover projects are clearly not intended to bear additional expense that could be burdensome.
Fischer (Part II) The exceptions to applicability of the IECC for reroofing are unclear, and include confusing language. This proposal includes definitions used in the roofing chapter of the IBC in order to better scope the appropriate exceptions to the envelope requirements in the IECC.

The proposed language clarifies that roof replacement triggers the envelope requirements, but only when the roof assembly is part of the thermal envelope and the insulation is entirely above the roof deck. If the insulation is located within an attic cavity, roof replacement itself does not trigger insulation upgrades. The proposal also makes it clear that recover and repairs are not intended to trigger energy upgrades, while ensuring that the opportunity to add roof insulation when the roof is replaced is not missed.

Reason: Dean, Harris, Misuriello, Prindle, Stone: The purpose of this code change is to clarify code requirements related to roofs on existing buildings by distinguishing between roof repairs, roof recovering, and roof replacement. The proposal creates new definitions for each of these actions (Chapter 2), clarifies that repair and recover are exceptions to the code (section C101.4.3), and clarifies that when certain roof replacements occur (new section C402.2.1.1), that the roof must meet the roof insulation requirements in Table C402.1.2 or C402.2.

While the code generally requires additions, alterations, renovations or repairs to comply with the code, the specific application in many instances may not be entirely clear or consistently interpreted and enforced. Roof replacements are a good example of this issue. This code proposal is intended to resolve any interpretation issues related to roof replacement and ensure that proper insulation is installed when the opportunity is presented. It is important that opportunities to improve the efficiency of existing buildings are seized when presented and the replacement of roofs is one such important opportunity.

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

Note: The four proposed definitions are terms defined in the IBC, the term 'roof replacement' is also found in the IgCC. The definitions found in the other codes are the same as proposed here.

C101.4.3-EC-FISCHER-DEAN-HARRIS-MISURIELLO- PRINDLE-STONE.doc

Committee Action Hearing Results

Part I of this code change was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee felt that the proposal didn't bring sufficient clarity to the exceptions and might allow a large area of a roof to be 'reconstructed' without taking advantage of an opportunity to achieve energy conservation improvements. The committee encouraged the SEHPCAC to try to bring consensus to this issue for the public comments.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry of the American Chemistry Council, requests Approval as Submitted.

Commenter's Reason: During the deliberation on a series of proposals related to the exceptions and clarifications to the scope and applicability of the IECC to existing buildings, the committee was unable to come to agreement regarding what concepts to take forward. In its reasoning statements on these proposals, the IECC-C committee directed the parties to work with the ICC Sustainability, Energy & High Performance Building Code Action Committee (SEHPCAC) on a potential public comment. CPI reviewed the technical issues with the SEHPCAC, and the SEHPCAC decided not to submit a public comment on CE13. Part II of this proposal was approved by the IECC-R committee, which felt the addition of definitions from the building code added clarity to the code. Part I is essentially the same, except that it also includes a clear requirement to address those conditions where roof replacement occurs - as part of the building thermal envelope - and where there is insulation entirely above deck. Because the code as written contains exceptions to exceptions from requirements, the code is not always clearly interpreted. This proposal uses definitions from the building code to clarify the current requirements.

Public Comment 2:

Michael D. Fischer, Kellen Company, representing the Polyisocyanurate Insulation Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: Each year about 2.5 billion square feet of roof coverings are installed on existing buildings. The opportunity to upgrade the insulation levels on these roof systems occurs just once in several decades- or longer when roofs are "recovered". When existing roofs (that are part of the building's thermal envelope) are removed and replaced, and when the roof assembly includes above-deck insulation, the energy code requires that the insulation levels comply with the requirements for new construction. Unfortunately, this requirement is prescribed using vague and confusing language. For example, the requirement does not utilize the terms defined in the IBC, and it does not correlate the requirements and exceptions to the definitions and the prescriptive insulation tables.

The IECC-R Committee recommended Part II of this proposal for approval as submitted. Part I contains the same definitions from the IBC, and provides clear unambiguous direction on how the energy code provisions apply to roof repair, roof recover, and roof replacement. The proposal does not change the requirements and does not increase the insulation levels for existing buildings. What it does provide is clarity.

In a survey of building departments in many states and regions in the US, we found that online roofing permit application forms rarely included any information on the energy code and required insulation levels. With this change, it will be easier for building departments to correlate the building code- and energy code- requirements for roof replacements.

This proposal will not increase the cost of construction; what it will do is make the code easier to interpret and enforce. Along the way, it will help ensure that the opportunity to save energy when replacing roofs is not lost.

Public Comment 3:

Brian Dean, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of CE15 Part I as submitted. Roofing replacement represents an important opportunity to increase the energy efficiency of our existing building stock. Because most roofs are designed to last for decades, it is important that the opportunity is not missed because the code requirements are vague. The IECC residential committee recommended Part II of CE15 for approval because it added clarity to the code; we believe that Part I should be approved for the same reason.

CE15 has a narrow scope, focusing only on the need to address insulation levels when the roof is part of the thermal envelope and the insulation is entirely above deck. When the roof is replaced as described in the definition of roof replacement and in related building code provisions, this proposal will improve the clarity of the code without increasing the current requirements.

CE15-13, Part I
Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE15-13

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed.~~ Roof recover or roof repair.
6. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

~~6~~7. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,

~~7~~8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

~~8~~9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new definitions as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

[B] REROOFING. The process of recovering or replacing an existing *roof covering*. See "Roof recover" and "Roof replacement."

[B] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[B] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

[B] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

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

Note: The four proposed definitions are terms defined in the IBC, the term ‘roof replacement’ is also found in the IgCC. The definitions found in the other codes are the same as proposed here.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This language improves the clarity of the code regarding roofing repair and replacement.

Assembly Action: **None**

CE20-13, Part I
C101.4.4, C101.4.5, R101.4.4, R101.4.5 (IRC N1101.4)

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy ~~that would result in an increase in demand for either fossil fuel or electrical energy~~ from an F, S or U occupancy to an occupancy other than F, S or U shall comply with this code. Any space that is converted to a dwelling unit or portion thereof, from another use or occupancy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

> **Exception**: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

C101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

> **Exception**: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

Reason: The existing IECC phrase "Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy…" (from Section C101.4.4) does not reference a standard for predicting energy demand, even in the Commentary, and could be subject to widely different interpretations. Storage, utility and industrial buildings are the most likely building types to have substantially deficient envelopes, and therefore this amendment replaces the current code language with a more straightforward requirement to bring any of those building types up to code when converting them to other uses.

The exceptions appended to both C101.4.4 and C101.4.5 are included to recognize the fact that converting an existing building to full compliance with current energy code is extremely difficult and costly. Conditions such as slab edges, structural thermal bridges, and window configurations cannot be practically remedied in many cases. Therefore, we propose an alternate compliance path allowing either a 10% higher envelope UxA value or a 10% higher Total Building Performance value. This will result in the preservation and adaptive reuse of more existing buildings, which itself is a significant energy conservation measure.

Note that the first sentence in each exception should be deleted if a separate proposal for a "component performance" building envelope U-value trade-off option is not approved.

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

C101.4.4-EC-KRANZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee found the language to be flawed and therefore would be difficult to enforce. The changes of occupancies listed are limited. Many are left out. Would it mean that a change from a warehouse to a restaurant would not require any energy improvements? Such was not found to be acceptable.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy from an F, S or U occupancy to an occupancy other than F, S or U shall comply with this code. Any space that is converted to a dwelling unit or portion thereof, from another use or occupancy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

> **Exception**: ~~Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA.~~ Where the total building performance option in Section C407 is used to comply with this section, the annual energy ~~consumption~~ cost of the proposed design is permitted to be 110 percent of the annual energy ~~consumption~~ cost otherwise allowed by Section C407.3 and Section C401.2 (3).

C101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

> **Exception**: ~~Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA~~. Where the total building performance option in Section C407 is used to comply with this section, the annual energy ~~consumption~~ cost of the proposed design is permitted to be 110 percent of the annual energy ~~consumption~~ cost otherwise allowed by Section C407.3 and Section C401.2 (3).

Commenter's Reason: The Committee's reason statement for disapproval suggests that the impact of this proposal was not fully understood. This proposal would certainly apply to a warehouse (S occupancy) being converted to a restaurant (A2 occupancy). The IECC language as it now stands is problematic for two reasons: it is both unenforceable and unaffordable. There is no standard mentioned in the code or even in the commentary that a code official could use to determine which proposed use would require more energy than an existing use. The current language also penalizes energy conservation, because if the existing occupant has been frugal with energy use, any new occupancy could be seen as requiring more energy and would thus mandate a full energy upgrade.

Enforceable: This proposal limits the provision to a specific group of use types that were not originally designed for comfort conditions.

Affordable: Instead of full energy code compliance for buildings going through a change of use or change in space conditions, this proposal permits 10% more energy use than required for new construction. This allows certain hard-to-upgrade existing conditions such as slab edges or building entrances to remain in place.

The first sentence of each exception has been stricken because the referenced component performance proposal (CE88-13) was not approved.

CE20-13, Part I
Final Action: AS AM AMPC____ D

CE20-13, Part II
C101.4.4, C101.4.5, R101.4.4, R101.4.5 (IRC N1101.4)

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy ~~that would result in an increase in demand for either fossil fuel or electrical energy~~ from an F, S or U occupancy to an occupancy other than F, S or U shall comply with this code. Any space that is converted to a dwelling unit or portion thereof, from another use or occupancy shall comply with this code.

> **Exception**: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

R101.4.5 (N1101.4) Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

> **Exception**: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

Reason: The existing IECC phrase "Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy…" (from Section C101.4.4) does not reference a standard for predicting energy demand, even in the Commentary, and could be subject to widely different interpretations. Storage, utility and industrial buildings are the most likely building types to have substantially deficient envelopes, and therefore this amendment replaces the current code language with a more straightforward requirement to bring any of those building types up to code when converting them to other uses.

The exceptions appended to both C101.4.4 and C101.4.5 are included to recognize the fact that converting an existing building to full compliance with current energy code is extremely difficult and costly. Conditions such as slab edges, structural thermal bridges, and window configurations cannot be practically remedied in many cases. Therefore, we propose an alternate compliance path allowing either a 10% higher envelope UxA value or a 10% higher Total Building Performance value. This will result in the preservation and adaptive reuse of more existing buildings, which itself is a significant energy conservation measure.

Note that the first sentence in each exception should be deleted if a separate proposal for a "component performance" building envelope U-value trade-off option is not approved.

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

C101.4.4-EC-KRANZ.doc

Committee Action Hearing Results

PART II – IECC – Residential
Committee Action: **Approved as Modified**

Modify the proposal as follows:

R101.4.4 Change in occupancy or use. ~~Spaces undergoing a change in occupancy from an F, S or U occupancy to an occupancy other than F, S or U shall comply with this code.~~ Any space that is converted to a dwelling unit or portion thereof, from another use or occupancy shall comply with this code.

> **Exception**: ~~Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA.~~ Where the simulated ~~total building~~ performance option in Section ~~C407~~ R405 is used to comply with this section, the annual energy ~~consumption~~ cost of the proposed design is permitted to be 110 percent of the annual energy ~~consumption~~ cost otherwise allowed by Section ~~C407.3~~ R405.3 ~~and Section C401.2 (3)~~ .

R101.4.5 (N1101.4) Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

> **Exception**: **Exception**: ~~Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA.~~ Where the simulated ~~total building~~ performance option in Section ~~C407~~ R405 is used to comply with this section, the annual energy ~~consumption~~ cost of the proposed design is permitted to be 110 percent of the annual energy ~~consumption~~ cost otherwise allowed by Section ~~C407.3~~ R405.3 ~~and Section C401.2 (3)~~ .

Committee Reason: The proposal clarifies the intent of the code and the exceptions provide additional flexibility. The modification provides succinct language applicable to the Residential Provisions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, requests Disapproval.

Commenter's Reason: We completely agree with the committee's reason statement for disapproval in Part I and could add several more instances that this proposed code section does not properly cover. The residential energy committee proposed a change that would even take it further to just say that anything modified to a dwelling unit has to comply with the code but what about modifications from a dwelling unit to another occupancy?

What if you went from a dwelling to an office, or dwelling unit to assisted living, or dwelling unit to education facility? These changes would require significant lighting changes, at a minimum, if not also mechanical changes, that should be covered. The language that already exists in the code is quite adequate and should not be replaced by the proposed language.

CE20-13, Part II
Final Action: AS AM AMPC____ D

CE21-13
C101.4.7 (New)

Proposed Change as Submitted

Proponent: John R. Norris, P.E., Fibrebond Corporation, representing self (bob.norris@fibrebond.com)

Add new text as follows:

C101.4.7 Exempt buildings. Buildings exempt from the provisions of the *International Energy Conservation Code,* include buildings designed for purposes other than general space comfort conditioning. Any building where heating or cooling systems are provided which are designed for purposes other than general space comfort conditioning. Buildings included in this exemption include:

1. Electrical equipment switching buildings which provide space conditioning for equipment only and in which no operators work on a regular and are less 1,000 square feet.

Reason: Additional insulation in these buildings will increase the amount of heat retained, thus making the air-conditioner run more often. It is not practical to comply with the *International Energy Conservation Code* envelope requirements.

Cost Impact: The code change proposed will not increase the cost of construction it will decrease the construction cost by as much as $11.30 per square foot depending on the Climate Zone. In addition there will be a monthly savings based on energy consumption. Actual savings will vary by Climate Zone. The useable area of the building is reduced by about 9% and larger buildings may be required to maintain clearances for equipment.

C101.4.7 (NEW)-EC-NORRIS.doc

Committee Action Hearing Results

The following errata were not posted to the ICC website.

C101.4.7 Exempt buildings. Buildings exempt from the provisions of the *International Energy Conservation Code,* include buildings designed for purposes other than general space comfort conditioning. Any building where heating or cooling systems are provided which are designed for purposes other than general space comfort conditioning. Buildings included in this exemption include:

1. Electrical equipment switching buildings which provide space conditioning for equipment only and in which no operators work on a regular basis and are less 1,000 square feet.

Committee Action: **Disapproved**

Committee Reason: The committee felt that the proposal was too broad and could be used for many buildings not intended by the proponent. The 1000 square foot exemption was felt to be too large.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Rosenstock, Edison Electric Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C101.4.7 Exempt buildings. Buildings exempt from the provisions of the *International Energy Conservation Code,* include buildings designed for purposes other than general space comfort conditioning. Any building where heating or cooling systems are provided which are designed for purposes other than general space comfort conditioning. Buildings included in this exemption include:

1. Electrical equipment switching buildings which provide space conditioning for equipment only and in which no operators work on a regular basis and are less ~~1,000~~ 1,100 square feet.

Commenter's Reason: This proposal should be approved as modified for the following reasons:

-These buildings are used to house equipment, and any space conditioning is only meant to prevent damage to equipment. The amount of time that people work in these spaces is usually minimal.

-Based on feedback from EEI member companies, anywhere from 50% to 100% of utility vaults or enclosed switching stations or substations are not conditioned. For electric equipment buildings that are conditioned, the temperature settings are typically much higher in the summer (85 degrees F or higher) and much lower in the winter (65 degrees F or lower) than spaces that are meant for human comfort conditioning.

-Some of the electric equipment vaults being used by utilities are sized at 18 feet by 60 feet, or 1,080 square feet. It is suggested that the size limit be increased to 1,100 square feet to accommodate the largest buildings that would fall under this category.

CE21-13

Final Action: AS AM AMPC____ D

CE22-13, Part I
C101.5.1, R101.5.1 (N1101.5)

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that <u>demonstrate compliance with</u> ~~meet~~ the ~~intent~~ <u>requirements</u> of this code.

Reason: The purpose of this code change is to clarify the code. Specifically, this proposal improves sections C101.5.1 and R101.5.1 by changing the reference from the "intent" to the "requirements" of the code and refocuses compliance materials on demonstrating compliance. As a result of this improved language, in order to be approved, compliance materials such as computer software or worksheets must be designed to demonstrate that a project meets the *requirements* of the IECC, not simply the "intent" of the IECC.

The current code language is vague because of the reference to the "intent" of the code. Presumably this is a reference to Sections C101.5.1 and R101.3, which provides no guidance as to specific compliance requirements. Alternately, some may claim that this language permits a subjective interpretation of "intent" by the authority enforcing the IECC. Neither interpretation is a suitable substitute for the specific requirements of the code.

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

C101.5.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal would harm the usefulness of this section for general administration of the code and specifically the consideration of alternate materials and methods. 'Intent' provides the code official a critical tool in the evaluation of compliance.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that demonstrate compliance with the requirements and intent of this code.

Commenter's Reason: We recommend approval of CE22, Part I, as modified by this public comment. This proposal as modified further clarifies that compliance software, worksheets, and other materials must show compliance with the specific requirements of the code, as well as meeting the intent of the IECC to "regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building."

Although we continue to think CE22, Part I, as submitted, would improve the code for the reasons outlined in the original reason statement, some concern was raised at the committee hearing about eliminating the reference to "intent" of the code and possibly reducing the flexibility needed by code officials to accomplish their important work. This proposal does not remove a code official's ability to make judgment calls on compliance, but rather refocuses code compliance software, worksheets, and other materials on the actual requirements of the code, not just an undefined and subjective "intent" of the code. By definition, compliance with the intent of the code in any given situation can only be determined in connection with the specific requirements. It will obviously still be within the discretion of the code official to exercise judgment on whether to approve computer software, worksheets, manuals or other materials in the first place. However, we propose to add the reference to word "intent" back into the provision in the proposed modification in order to address this concern and reinforce this discretion.

CE22-13, Part I

Final Action: AS AM AMPC____ D

CE22-13, Part II
C101.5.1, R101.5.1 (N1101.5)

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.5.1 (N1101.5) Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that <u>demonstrate compliance with</u> ~~meet~~ the ~~intent~~ <u>requirements</u> of this code.

Reason: The purpose of this code change is to clarify the code. Specifically, this proposal improves sections C101.5.1 and R101.5.1 by changing the reference from the "intent" to the "requirements" of the code and refocuses compliance materials on demonstrating compliance. As a result of this improved language, in order to be approved, compliance materials such as computer software or worksheets must be designed to demonstrate that a project meets the *requirements* of the IECC, not simply the "intent" of the IECC.

The current code language is vague because of the reference to the "intent" of the code. Presumably this is a reference to Sections C101.5.1 and R101.3, which provides no guidance as to specific compliance requirements. Alternately, some may claim that this language permits a subjective interpretation of "intent" by the authority enforcing the IECC. Neither interpretation is a suitable substitute for the specific requirements of the code.

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

C101.5.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: The proposed change would remove the flexibility that the code official needs to enforce this code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R101.5.1 (N1101.5) Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that demonstrate compliance with the requirements <u>and intent</u> of this code.

Commenter's Reason: We recommend approval of CE22, Part II, as modified by this public comment. This proposal as modified further clarifies that compliance software, worksheets, and other materials must show compliance with the specific requirements of the code, as well as meeting the intent of the IECC to "regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building."

Although we continue to think CE22, Part II, as submitted, would improve the code for the reasons outlined in the original reason statement, some concern was raised at the committee hearing about eliminating the reference to "intent" of the code and possibly reducing the flexibility needed by code officials to accomplish their important work. This proposal does not remove a code official's ability to make judgment calls on compliance, but rather refocuses code compliance software, worksheets, and other materials on the actual requirements of the code, not just an undefined and subjective "intent" of the code. By definition, compliance with the intent of the code in any given situation can only be determined in connection with the specific requirements. It will obviously still be within the discretion of the code official to exercise judgment on whether to approve computer software, worksheets, manuals or other materials in the first place. However, we propose to add the reference to word "intent" back into the provision in the proposed modification in order to address this concern and reinforce this discretion.

CE22-13, Part II
Final Action: AS AM AMPC____ D

CE24-13
C101.5.2, C202 (NEW)

Proposed Change as Submitted

Proponent: Vickie Lovell, InterCode Inc., representing National Greenhouse Manufacturers Association (vickie@intercodeinc.com)

Revise as follows:

C101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h · ft^2 (10.7 W/m^2) or 1.0 $watt/ft^2$ (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.
3. Greenhouses.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

GREENHOUSE. A structure or a separate area of a building that maintains a specialized environment essential for the cultivation, protection or maintenance of plants.

Reason: (for 101.5.2) Energy codes and standards have historically applied to buildings intended primarily for human occupancy and use. There are structures, buildings and space uses where strict application of the code poses increasing challenges. All types of agricultural buildings including barns, livestock shelters, sheds, and stables are unique structures in design, construction and operation and different from other commercial buildings in terms of internal loads, schedules, and building usage. Included in those types of structures are greenhouses and separated portions of buildings whose primary function is the cultivation, protection or maintenance of plants.

This proposal exempts greenhouses or separated portions of buildings whose primary function is the cultivation, protection or maintenance of plants from the building thermal envelope of the International Energy Conservation Code. This code change is intended to provide clarity to what the code already says about greenhouses, and what parts of the energy code should be required for compliance.

Strict application of the building envelope provisions of the code in greenhouses is cost prohibitive. Compliance with the building thermal envelope for greenhouses may actually be counterproductive, even detrimental to plant growth, since most plants require controlling the available natural light and highly specialized temperature-controlled conditions. Arbitrarily changing growing conditions can result in reduced output for greenhouse growers, and will have serious negative consequences to the US agricultural/horticultural/floricultural economy. Therefore, this topic merits thoughtful consideration of the implications and ramifications of requiring greenhouses to comply with the entirety of the IECC.

Although the current title of section C101.5.2 is somewhat narrow in scope, it provides for some exemptions to the building thermal envelope provisions in the code. The current provisions in Section C101.5.2 would exempt such buildings from the thermal envelope provisions in the code if they did not contain conditioned space (room or space within the building that is being heated or cooled) or the peak design rate of energy use was less that 1 watt per square foot for space conditioning purposes. However, some greenhouses do contain conditioned space that exceeds the stated peak connected load. In reality, the whole point of a greenhouse is to control a unique environment for the cultivation, protection or maintenance of plants, and such environment is not intended to maintain suitable conditions specifically for human occupancy. Currently such buildings are not exempt from the building thermal envelope provisions of the code. But greenhouses should be exempt.

Other requirements of the IECC and the IBC would still apply to Group U greenhouses. All other building code requirements would still apply for structural, fire, egress, accessibility for such cases where a greenhouse is also used as a retail business, such as garden centers and retail stores that sell plants to the public. This exemption is NOT intended to apply to retail businesses who may display plants and flowers in regular buildings that are not intended to be greenhouses and are environmentally controlled as retail spaces. This would not apply to office buildings and atriums where plants are displayed for aesthetical purpose. But it could capture botanical gardens which also maintain a specialized environment. In such businesses, the plants may be able to survive in the ambient temperature without specifically managing their growing conditions and environment. The proposed definition makes it clear that it is a unique climate controlled environment that defines a greenhouse or similar facility.

Some universities maintain greenhouses for research and studies in horticulture and should be exempt. In these cases, the IBC building, fire structural and other such requirements for mercantile, business and education still apply if the greenhouse is permitted as a Group B, E or M use or occupancy. These IBC provisions based on occupancy are primarily for the comfort and/or protection of people, and appropriately should apply. All Group U provisions of the IBC would still apply. Additionally, the IECC requirements for HVAC would still apply.

The proposed language is based on a current exemption used in the energy code of the State of Wisconsin. A NY Department of State Codes Division opinion on this topic considers all buildings used primarily for agricultural purposes as commercial processes and do not need to comply with the energy codes of the state based upon an ASHRAE 90.1 exemption. This included any greenhouse whether built on a commercial or residential building property site since the greenhouse is not designed for occupancy and falls under their view of a "commercial processes".

The initiatives to make this industry more energy efficient and sustainable are in motion. The USDA and other federal agencies and private organizations are making huge strides in helping growers be more energy efficient and sustainable by using soil amendments, reducing runoff from irrigation, using appropriate methods of reducing energy consumption, using improved pest management methods, reducing potable water or other natural surface or subsurface water resources, reducing waste, and promoting organic growing.

The current IECC requirements that reduce energy use for other aspects of greenhouses are appropriate EXCEPT the requirements that impede or inhibit the growth of plants, which is the primary function of a greenhouse.

(Section 202) The word "greenhouse" conjures up diverse images as to what a greenhouse might look like including the numerous ways plants are cultivated, marketed and sold. However, this definition captures the primary purpose of a greenhouse, which is to create unique environmental conditions inside a structure or a separated portion of a building that are ESSENTIAL for the cultivation, protection or maintenance of plants. This proposed definition is intended to exclude a retail business owner that brings plants indoors temporarily for display or seasonal promotions.

That environment includes control of the available natural or artificial light, managing the temperature and humidity, dispersing and managing water and controlling the growing medium regardless of the outside climate conditions. If that specific environment is not maintained, the plants cannot survive.

Previous code discussions regarding greenhouses have often bogged down because the focus gets shifted to whom or how the plants are being marketed and sold, public access or not, and other conditions. However, that information is irrelevant to this definition. The proposed definition makes it clear that **the primary descriptive feature of a greenhouse is the unique environment that must be maintained in order for the plants inside the greenhouse to survive.**

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

C202-GREENHOUSE (NEW)-EC-LOVELL.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

GREENHOUSE. A structure or separate area of a building that maintains a specialized <u>sunlit</u> environment <u>specific to</u> ~~essential for~~ cultivation, protection or maintenance of plants.

(Portions of proposal not shown remain unchanged)

Committee Reason: The committee concluded that greenhouses as defined should be exempt from envelope provisions. Environments needed for plants would be difficult to achieve if full compliance with envelope provisions was mandated. The committee expressed concern that the separation from parts of a building which are conditioned for human use provide thermal isolation, but did not include such modification.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Vickie Lovell, Intercode, Inc. representing National Greenhouse Manufacturers Association, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

GREENHOUSE. A structure or ~~separate,~~ <u>thermally isolated</u> area of a building that maintains a specialized sunlit environment specific to <u>and essential</u> for cultivation, protection or maintenance of plants.

Commenter's Reason: The purpose of the greenhouse is to create a unique environment that is essential for the plants to thrive.

Although this proposal was overwhelmingly recommended for approval, some interested parties expressed concern that conditioned portions of buildings used primarily for human occupancy such as sunrooms, atria, lobbies, glass enclosed walkways, and other areas that sometimes feature could be considered to be "greenhouses" by designers trying to take advantage of exceptions to the code provided to commercial growers.

This modification provides additional clarification to the definition that helps the code official identify the intention of the building designer when compared to other buildings that may feature plants for aesthetic purposes. It clarifies that the separated, unique and specialized environment for the intentional cultivation of a particular crop is what defines a greenhouse. Without the specific and essential environment created by the greenhouse, the plants could not thrive.

This modification to the original proposal purposely EXCLUDES those areas or types of buildings such as sunrooms, atria, lobbies, glass enclosed walkways, and similar areas for human occupancy - even if plants are prominently featured.

Public Comment 2:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

GREENHOUSE. A structure or a separate area of a building that maintains a specialized sunlit environment ~~specific to~~ exclusively used for the cultivation, protection or maintenance of plants.

Commenter's Reason: The current language in CE 24 would allow a greenhouse to be used for both retail and as an area for the cultivation, protection or maintenance or plants as there is no language that would prevent these spaces from serving dual purposes. There is no limit on the quantity of space conditioning in the structure only that what is sufficient to protect the plants. The exemption for commercial greenhouses is needed, as energy codes were not intended to address are glass buildings with this type of specific purpose, but the definition must be clear that the greenhouse should only be used for cultivation, production or maintenance of plants and not for other purposes e.g. retail spaces where the space could be conditioned for human occupancy. The addition of the words "exclusively used" will allow jurisdictions to accurately interpret this exemption.

Public Comment 3:

Ray A. Bucklin, Ph.D, PE, University of Florida, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: This Public Comment is intended to express my support for the committee action on CE24-13 for "Approved as Modified."

In your deliberations for the revisions for the 2015 ICC Energy Conservation Code I ask that the information provided by the National Greenhouse Manufacturers Association be given your full consideration and approval. The NGMA is the leading organization in the USA representing an association of companies providing greenhouse designs, materials, hardware, supplies and equipment which represents all the major aspects of greenhouse systems for the crop producers.

A greenhouse is a specialized building for plant production, and therefore it should not be considered in the same way as other more general building designs in its code requirements. The greenhouse must orchestrate numerous climate control and crop supportive sub-systems to provide a particular and necessary greenhouse environment to manage specific crops with the goal of obtaining the production quantity and quality of product to meet the market demands. This is much different than a building for human comfort, or for non-agricultural, commercial use.

As proposed by CE 25, Florida already exempts agricultural buildings, including greenhouses, from energy and building code requirements because they are not within the scope of the code requirements for human habitation, safety, use, or comfort.

These proposals do not exempt greenhouses from other provisions of the codes, only for the thermal envelope requirements of IECC, which are those that, without caution, would negatively affect greenhouse growing conditions for plants. The other building and energy code provisions would still apply, while the growers and greenhouse designers would have the flexibility to the final decisions about the optimum conditions for light and temperature based on the crop and the climate zone.

As a member of the faculty of the Agricultural and Biological Engineering Department of the University of Florida I have over thirty years of experience working with teaching, research and extension education programs involving Florida's greenhouse industry. I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

Public Comment 4:

Richard S. Gates, Ph.D, P.E., University of Illinois at Urbana-Campaign, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: I am requesting that you please fully consider the information provided by the National Greenhouse

Manufacturers Association, with regards to energy code applications to greenhouse systems.

A greenhouse is a highly specialized system that must provide specific (but variable) indoor conditions of temperature, humidity and light to optimally manage the crops. The optimal management is a balance of numerous factors, including energy use, market forces, season, disease pressure, labor costs and a myriad of other issues that must be accommodated so as to obtain the production and quality of product for specific markets. A greenhouse environment must be controlled to meet the needs of the various crops in production by offsetting the various climate conditions of the particular region where it resides. Therefore it should not be considered equal in code requirements to other traditional buildings. Similarly it is questionable that a baseline code for all of the U.S. would even be feasible.

One troublesome outcome of such an (ill-advised) revision would be the encouragement of even more non-domestic vegetable and floral crops sold in the U.S. for cases where lower nondomestic labor and optimal climate can compete vigorously with higher cost, domestic, greenhouse-produced crops. Look no further than your local grocery store's floral section for evidence of this long-term reality. I would be concerned about an energy code revision that further promotes this erosion of domestic food security. I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

Public Comment 5:

Dr. Gene Giacomelli, University of Arizona, Controlled Environment Agricultural Center, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: In your deliberations for the revisions for the 2015 ICC Energy Conservation Code I ask that the information provided by the National Greenhouse Manufacturers Association be given your full consideration and approval. The NGMA is the leading organization in the USA representing an association of companies providing greenhouse designs, materials, hardware, supplies and equipment which represents all the major aspects of greenhouse systems for the crop producers.

A greenhouse is a specialized building for plant production, and therefore it should not be considered an equal to other more general building designs in its code requirements. The greenhouse must orchestrate numerous climate control and crop supportive sub-systems to provide a particular and necessary greenhouse environment to manage specific crops with the goal of obtaining the production quantity and quality of product to meet the market demands. This is much different than a building for human comfort, or for non-agricultural, commercial use.

These proposals do not exempt greenhouses from other provisions of the codes, only for the thermal envelope and interior lighting requirements of IECC, which are those that, without caution, would negatively affect the greenhouse growing conditions for the plants. The other building and energy code provisions would still apply, while the growers and greenhouse designers would have the flexibility to the final decisions about the optimum conditions for light and temperature based on the crop and the climate zone.

As Director of the Controlled Environment Agricultural Center at the University of Arizona, I have more than 35 years of experience in the development, design and education within greenhouses for crop production.

I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

Public Comment 6:

David S. Kulina, Vice President, Engel Architects, LLC, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: This Public Comment is intended to express my support for the committee action on CE24-13 for "Approved as Modified."

As the architect of record for numerous greenhouses used for plant propagation, horticultural education, campus maintenance, and wholesale and retail sales, we (Engel Architects) are very familiar with and have experienced the conflicts between provisions of the IECC and maintaining healthy plants.

We have typically been fortunate to have code officials that have understood the conflicts and our concerns. However, the fact remains that even retail greenhouses must be able to allow plants to thrive despite some level of human discomfort; else the plants will suffer and become unhealthy, and the appearance of the foliage will decline. As for growing greenhouses, the product is what is critical, not worker comfort.

We also are involved with the construction of agricultural buildings. Once again, the needs of the animals take precedence over the comfort of workers. The need for extremely large amounts of fresh air often precludes any thermal barriers from being effective.

Neither of these changes would affect the structural, life safety, and other features within the codes that remain important for the people that use these buildings.

I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

Public Comment 7:

Mark Lefsrud, McGill University, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action hearing.

Commenter's Reason: This letter is intended to express my support for the committee action on CE24-13 for "Approved as

Modified."

I wish you would consider and approve the information provided by the National Greenhouse Manufacturers Association for the revisions for the 2015 ICC Energy Conservation Code. The NGMA is the leading organization in the USA representing an association of companies providing greenhouse designs, materials, hardware, supplies and equipment which represents all the major aspects of greenhouse systems for the crop producers. This group also represents a number of Canadian greenhouse companies and it uses a critical resource in the development of industry and government code within Canada.

Greenhouse designers and operators in Canada are very aware of the requirements of energy management and thermal envelope and we are worried that if this revision is not accepted it will severely limit greenhouse development and operation in cold northern climates, including Canada. Designing for a greenhouse in a cold climate is a challenge. Using numerous climate controls and crop systems provides a necessary greenhouse environment to manage production quantity and quality of product to meet the market demands. The energy balancing is significantly different than a building for human comfort. These proposals do not exempt greenhouses from other provisions of the codes, only for the thermal envelope requirements of IECC. Without this exception the growers and greenhouse designers would not have the flexibility to make the final decisions about the optimum conditions for light and temperature based on the crop and the climate zone.

As an Assistant Professor at McGill University, I have more than 15 years of experience managing greenhouses for crop production.

I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified".

Public Comment 8:

David Mears, Professor Emeritus, Rutgers University, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: This Public Comment is intended to express my support for the committee action on CE24-13 for "Approved as Modi**fied."**

In your deliberations for the revisions for the 2015 ICC Energy Conservation Code I ask that the information provided by the National Greenhouse Manufacturers Association be given your full consideration and approval. The NGMA is the leading organization in the USA representing an association of companies providing greenhouse designs, materials, hardware, supplies and equipment which represents all the major aspects of greenhouse systems for the crop producers.

A greenhouse is a specialized building for plant production, and therefore it should not be considered an equal to other more general building designs in its code requirements. The greenhouse must orchestrate numerous climate control and crop supportive sub-systems to provide a particular and necessary greenhouse environment to manage specific crops with the goal of obtaining the production quantity and quality of product to meet the market demands. This is much different than a building for human comfort, or for non-agricultural, commercial use.

These proposals do not exempt greenhouses from other provisions of the codes, only for the thermal envelope requirements of IECC, which are those that, without caution, would negatively affect the greenhouse growing conditions for the plants. The other building and energy code provisions would still apply, while the growers and greenhouse designers would have the flexibility to the final decisions about the optimum conditions for light and temperature based on the crop and the climate zone.

We developed a very strong greenhouse engineering program at Rutgers University from the late 1960's and much of the research was focused on energy conservation and alternatives to fossil fuel use. Major developments in our program included the double layer poly type greenhouses, movable thermal curtains, floor heating and IR absorbing film, all of which have made substantial reductions in energy consumption for commercial greenhouses. Several of my students currently direct similar academic research efforts in the U.S. and abroad, continuing the progress on energy efficiency

I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

Public Comment 9:

Clare Miflin, R.A. Leed AP, Kiss + Cathcart, Architects, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: This Public Comment is intended to express my support for the committee action on CE24-13 for "Approved as Modified**."**

As an architect with a specialty in sustainable design, I think it is very important that food production is also sustainable. Greenhouses allow for local sustainable food production, and we (Kiss + Cathcart, Architects) think should be as energy efficient as possible. Fully glazed buildings such as greenhouses are almost impossible to construct under current energy codes, which is why we think there should be an exemption for them under the energy code.

We have been architects for greenhouses for local food production in New York City, and have communicated with code officials in New York State and NYC about how the energy code views greenhouses. Michael Burnetter from NYS DOE's response was as follows:

Question:

Does the adoption of the 2009 IECC based code which does not address any specific exceptions for agricultural or greenhouse buildings mean that New York will now require the insulation of barns and greenhouses?

Answer:

No, as the 2007 (a permitted compliance path in the 2010 ECCCNYS) ASHRAE standard 90.1 states in section 2.3 (c) that all provisions of that standard do not apply to certain buildings and "portions of building systems that use *energy primarily to provide for industrial, manufacturing, or commercial processes". The Department of State Codes Division opinion considers all buildings used primarily for agricultural purposes as commercial processes and hence do not need to comply with the energy codes of the state based upon the ASHRAE exemption. This includes any greenhouse whether built on a commercial or residential building property site since the greenhouse or barn is not designed for occupancy and only falls under our view of a "commercial processes". The code official would need to agree that the intent of the use is primarily for agricultural purposes only*.

We feel that the IECC should also have a permitted compliance path and are concerned that this particular path is in jeopardy. We support CE24 as it defines greenhouses, a currently undefined term per code. This will prevent "sunrooms" and other spaces not used for plant production from being portrayed as greenhouses.

I have been a presenter of the NY State "Cracking the Code" course on the 2010 NYS Energy Code, and am fully aware of how a building can comply with energy code. I see no way, other than a large renewable energy source to supply most energy needs, that a greenhouse can comply with energy code using current building materials. This is beyond the means of an agricultural business that has to compete with much lower cost food production trucked or flown from warmer locations. I think that the code officials should consider the broader sustainable picture, and food miles contribute substantially to the environmental cost of food production.

Greenhouses are not buildings designed primarily for human habitation, and plants have much greater need of daylight than humans, and arbitrarily applying the same energy code requirements is a misapplication of the code.

I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

Public Comment 10:

David S. Ross, Professor Emeritus, University of Maryland, representing self, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearing.

Commenter's Reason: In your discussions of revisions for the 2015 ICC Energy Conservation Code I ask that the proposals provided by the National Greenhouse Manufacturers Association be given your full consideration and approval. The NGMA is the leading USA organization representing companies providing greenhouse designs, materials, hardware, supplies and equipment and therefore represents all the major aspects of greenhouse systems for the crop producers.

I am an agricultural engineer with 37 years of experience in greenhouse environmental control and systems.

I urge the ICC voting membership to sustain the committee and vote for "Approved as Modified."

CE24-13

Final Action: AS AM AMPC____ D

CE27-13

C101.5.3 (NEW)

Proposed Change as Submitted

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C101.5.3 Equipment buildings. Buildings that comply with all of the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area no more than 500 square feet (50 m^2).
2. Are intended to house electronic equipment with installed equipment power totaling at least 7 watts per square foot and not intended for human occupancy.
3. Have heating system capacity is no greater than 5 kW (17,000 Btu/hr) and heating thermostat setpoint is restricted to no more than 50°F (10°C).
4. Have an average wall and roof U-factor less than 0.120 in climate zones 1-5 and less than 0.200 in climate zones 6 through 8.
5. Comply with the roof solar reflectance and thermal emittance provisions for Climate Zone 1.

Reason: The application of energy codes and standards to buildings not intended primarily for human occupancy and use continue to pose increasing challenges to the strict application of the code. Equipment buildings, shelters, or sheds are installed to protect electronic equipment from the weather and provide primarily cooling conditioning. Heating is installed for emergency backup operation and is typically limited to 40°F or less by a setpoint. Due to the high density of electronic equipment installed, heat is rarely needed and cooling predominates. In this situation, less insulation is actually desirable from an annual energy use standpoint.
This exemption is limited to stand alone equipment buildings no more than 500 square feet in area. Simplified insulation requirements that apply to an average of the roof and wall insulation are provided. This type of building is often made with 3" concrete, internal foam insulation, and a plywood interior with similar construction for roof and walls. To reduce insulation requirements, the ASHRAE 90.1 option may be pursued, as the building would qualify as a semi-heated space. The U-factors required for semi-heated spaces and available in standard construction are listed below, along with the U-factors required in the proposal. The proposed requirements can be met by readily available concrete, wood, or steel frame construction.

Target U-Factors for Equipment Shelters	U-factor
Semi-heated U-factors from ASHRAE 90.1-2010	
CZ-1 Semi-heated average wall/roof U-factor	0.251
CZ-5 Semi-heated average wall/roof U-factor	0.097
CZ-8 Semi-heated average wall/roof U-factor	0.087
Wall U-factors based on Appendix A, ASHRAE 90.1-2010	
Industry Standard: 3" Concrete with R-10	0.114
Metal studs, R-13, no continuous insulation	0.113
Wood studs, R-11, no continuous insulation	0.096
3" Concrete with R-5 insulation	0.195
Metal studs, R-6 insulation, no continuous insulation	0.184
Proposed Equipment Shelter Average Wall & Roof U-factor	
Climate Zone 1-5; Average U-factor shall be less than	**0.200**
Climate Zone 6-8; Average U-factor shall be less than	**0.120**

The basis of the exemption is that there is significant equipment installed that needs cooling most of the year. In this situation, less insulation reduces annual energy cost because it allows for beneficial heat loss. At around 7 watts per square foot of equipment load, the heat loss is offset by the equipment load, with the proposed insulation resulting in very little heating load.
It is important to note that this exemption applies to the building thermal envelope provisions only. Any HVAC, service water heating, and/or lighting systems in such buildings would still be required to meet the provisions of the code. Through this code change it is hoped that additional clarity can be provided for equipment buildings as to when they are or are not required to meet the building thermal envelope provisions of the code.

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

C101.5.3 (NEW)-EC-MAKELA.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

4. Have an average wall and roof U-factor less than ~~0.120~~ 0.200 in climate zones 1 through 5 and less than ~~0.200~~ 0.120 in climate zones 6 through 8.

(Portions of proposal not shown remain unchanged)

Committee Reason: Small equipment buildings are usually not intended for more than intermittent occupancy and such need to be provided with specific provisions. This proposal doesn't fully waive the envelope requirements, but provides a limited and qualified exemption. The modification corrected the U-factor numbers which had been reversed in the published proposal.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, Manager Building Inspections, Clark County Development Services, representing ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**C101.5.3**~~ **C402.1.2 Equipment buildings.** Buildings that comply with all of the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area no more than 500 square feet (50 m^2).
2. Are intended to house electronic equipment with installed equipment power totaling at least 7 watts per square foot and not intended for human occupancy.
3. Have heating system capacity is no greater than 5 kW (17,000 Btu/hr) and heating thermostat setpoint is restricted to no more than 50°F (10°C).
4. Have an average wall and roof U-factor less than 0.200 in climate zones 1-5 and less than 0.120 in climate zones 6 through 8.
5. Comply with the roof solar reflectance and thermal emittance provisions for Climate Zone 1.

Commenter's Reason: The intent of the public comment is to simply relocate the proposed text from Chapter 1 to Chapter 4 of the Commercial IECC. CE23-13 was approved by the committee. It moved provisions for low energy building from Chapter 1 to be located within the envelop provisions of Chapter 4. The low energy provisions are an exception to complying with the envelop requirements which are found in Section C402. CE23 establishes low energy buildings as Section C402.1.1. CE27-13 is a similar concept and is also a detailed exception to the envelop standards. It should be relocated to Chapter 4 and be located after the low energy building provisions.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE27-13

Final Action: AS AM AMPC____ D

CE28-13, Part I
C102.1, R102.1

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the ~~intent~~ <u>requirements</u> of this code.

Reason: The purpose of this code change is to clarify the code. This proposal removes uncertainty from the IECC by clarifying that alternative materials, methods of construction, designs, or systems still must meet the actual requirements, not just the "intent" of the IECC.

The current code language is vague because of the reference to the "intent" of the code. Presumably this is a reference to Section R101.3, which provides no guidance as to specific compliance requirements. Alternately, some may claim that this language permits a subjective interpretation of "intent" by the authority enforcing the IECC. Neither interpretation is a suitable substitute for the specific requirements of the code.

The current language may be viewed by some as creating a loophole that allows a code user to avoid meeting the requirements of the IECC while claiming that a product or system meets a subjective interpretation of the IECC's "intent." The lack of specificity places the code official in a difficult, and potentially risky position of making judgments based on a subjective interpretation of the code's "intent."

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

C102.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: Consistent with the action taken on CE22-13. Intent is essential wording for this provision.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Stephen Turchen, Fairfax County, VA, representing Virginia Building and Code Officials Association, requests Approval as Submitted.

Commenter's Reason: This code change proposal should be approved for exactly the reasons stated in the proponent's original submittal.

"Intent" is highly subjective; the requirements of the IECC are not, as they are clearly stated in the text of the code. The IECC does have an "Intent" paragraph: R101.3 in the residential section, C101.3 in the commercial section. We believe that the Intent paragraph is supposed to guide the development and scope of the code: to (paraphrasing) ensure that *buildings are designed and constructed to effectively use and conserve energy over their useful lives.* Each such specific provision added into the code should be able to meet this test of Intent. However, it is the specific provisions, once finalized, that are enforced.

If a designer is converting unconditioned space to conditioned space and the code requirement for the walls is R13, should he be allowed to install R11 in the walls because he is "effectively conserving energy" (relative to the R0 that was there previously)? Potential situations like this do not provide a workable framework within which code officials can effectively do their jobs. Intent is a legitimate subject for debate at the ICC code development hearings. It is not a workable criterion for enforcing a building code on a daily basis.

CE8-13, Part I

Final Action: AS AM AMPC____ D

CE28-13, Part II
C102.1, R102.1

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the ~~intent~~ requirements of this code.

Reason: The purpose of this code change is to clarify the code. This proposal removes uncertainty from the IECC by clarifying that alternative materials, methods of construction, designs, or systems still must meet the actual requirements, not just the “intent” of the IECC.

The current code language is vague because of the reference to the “intent” of the code. Presumably this is a reference to Section R101.3, which provides no guidance as to specific compliance requirements. Alternately, some may claim that this language permits a subjective interpretation of “intent” by the authority enforcing the IECC. Neither interpretation is a suitable substitute for the specific requirements of the code.

The current language may be viewed by some as creating a loophole that allows a code user to avoid meeting the requirements of the IECC while claiming that a product or system meets a subjective interpretation of the IECC’s “intent.” The lack of specificity places the code official in a difficult, and potentially risky position of making judgments based on a subjective interpretation of the code’s “intent.”

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

C102.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: Consistent with the committee’s disapproval of CE22.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Stephen Turchen, Fairfax County, VA, representing Virginia Building and Code Officials Association, requests Approval as Submitted.

Commenter's Reason: This code change proposal should be approved for exactly the reasons stated in the proponent's original submittal.

"Intent" is highly subjective; the requirements of the IECC are not, as they are clearly stated in the text of the code.
The IECC does have an "Intent" paragraph: R101.3 in the residential section, C101.3 in the commercial section. We believe that the Intent paragraph is supposed to guide the development and scope of the code: to (paraphrasing) ensure that *buildings are designed and constructed to effectively use and conserve energy over their useful lives.* Each such specific provision added into the code should be able to meet this test of Intent. However, it is the specific provisions, once finalized, that are enforced.

If a designer is converting unconditioned space to conditioned space and the code requirement for the walls is R13, should he be allowed to install R11 in the walls because he is "effectively conserving energy" (relative to the R0 that was there previously)? Potential situations like this do not provide a workable framework within which code officials can effectively do their jobs. Intent is a legitimate subject for debate at the ICC code development hearings. It is not a workable criterion for enforcing a building code on a daily basis.

CE28-13, Part II
Final Action: AS AM AMPC____ D

CE29-13, Part I
C102.1, C102.1.1, C102.1.2 (New), R102.1, R102.1.1 (IRC N1101.7), R102.1.2 (New)

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1 General. ~~This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~ The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code.

C102.1.1 ~~Above code~~ Alternate programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to meet or exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as "mandatory" in Chapter 4 shall be met.~~

C102.1.2 Accredited programs and designs. The code official or other authority having jurisdiction shall be permitted to accept alternative national programs and designs that have received accreditation by an independent accreditation body. The independent accreditation body shall certify programs or designs as meeting or exceeding the energy efficiency required by this code. Buildings and designs that have received approval in writing and are verified by an approved party shall be considered in compliance with this code.

Reason: The last section is most important. It sets the stage for accrediting programs outside the code as at least as good as code. Some programs, such as RESNET's HERS are currently too proprietary to name in the code; however, they might be accredited, perhaps with restrictions, then that existing infrastructure can help deliver efficient homes. Just as important, there will be a variety of good programs that can help deliver energy efficiency. Some local, some national, some public, some private, some focused on specific types of homes, others broad; all can help. The code official does not have time to look at all the individual programs. We need a mechanism to accredit those programs or their energy efficient designs, This is a way to help deliver verified energy efficiency where this is acceptable to the code official. Code officials need a chance to catch their breath.

The "General" section lifts code text from the IRC to better describe the flexibility in the IECC.

In the middle section above, the IECC is made consistent with the I-code concept of potentially approving an alternative that is at least as good as the code, "meet or exceed", as in this change. It makes no sense to meet an alternative then go back and say to meet the code too, so the "mandatory" sentence was removed.

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

C102.1-EC-CONNER.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Modified

Modify the proposal as follows:

C102.1.1 Alternate programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to meet or exceed the energy efficiency required by this code. Buildings approved in writing in such an energy efficiency program shall be considered in compliance with this code. The requirements identified as 'mandatory' in Chapter 4 shall be met.

(Portions of proposal not shown remain unchanged)

Committee Reason: While the code does provide the code official with the authority to approve alternate compliance methods, this proposal provides text which allows the code official to rely on the review and accreditation by others of equivalent or above code programs. This would be helpful to code officials and save their limited time. The text could help drive the development of accredited programs. Each such program provides flexibility for designers.

Assembly Action: Disapproved

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and because public comments were submitted.

Public Comment 1:

Tim Ryan, International Association of Building Officials (IABO), Don Surrena, National Association of Home Builders, request Approved as Submitted.

Commenter's Reason: The floor modification made to this proposal significantly takes away the benefit of having alternate programs being deemed equivalent to the energy code by the jurisdiction. Having to do all the mandatory requirements essentially infers that you can perform whatever alternative program you like, but then be sure that you comply with the IECC; thereby defeating the purpose of the section.

This is a very important proposal to increase the adoptability, usability and enforceability of the IECC.

Public Comment 2:

Brian Dean, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc, request Disapproval.

Commenter's Reason: We recommend disapproval of CE29, Part I. The residential energy committee correctly recommended disapproval of CE29, Part II. Although the commercial energy committee improved CE29 Part I by adding back the requirement that all mandatory requirements be met, CE29 Part I still vastly expands the range of programs or designs that "shall be considered in compliance with [the IECC]." If, as the proponent acknowledges, "some programs, such as RESNET's HERS are currently too proprietary to name in the code," then why should the IECC encourage certification to these programs as acceptable compliance alternatives? CE29 Part I provides no backstops or limitations, and provides no means of determining whether these programs are actually equivalent to the IECC or whether they are acceptable as compliance alternatives. Instead, CE29 Part I invites proponents of programs other than the IECC to claim equivalence. This forces the code official to make determinations on potentially dozens of different programs or designs – many of which will be proprietary and not developed through an open, consensus-based process like the IECC – instead of simply enforcing the code requirements.

Although the proponent may argue that under Section C102.1.1, a code official already has the authority to deem another "national, state or local energy efficiency program to exceed the efficiency required by [the IECC]," CE29 Part I expands the reach of this section to include "alternative national programs and designs," and leaves it up to the accreditation body to determine whether the programs exceed the efficiency of the code. Code compliance should be rooted in the IECC, and exceptions to these requirements should be narrowly applied by the authority having jurisdiction. Because CE29 Part I broadens these alternatives well beyond the scope of the current IECC, CE29 Part I should be disapproved.

CE29-13, Part I

Final Action: AS AM AMPC____ D

CE29-13, Part II

C102.1, C102.1.1, C102.1.2 (NEW), R102.1, R102.1.1 (IRC N1101.7), R102.1.2 (NEW)

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1 General. ~~This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~ The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code.

R102.1.1 (N1101.7) ~~Above code~~ Alternate programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to meet or exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as "mandatory" in Chapter 4 shall be met.~~

R102.1.2 Accredited programs and designs. The code official or other authority having jurisdiction shall be permitted to accept alternative national programs and designs that have received accreditation by an independent accreditation body. The independent accreditation body shall certify programs or designs as meeting or exceeding the energy efficiency required by this code. Buildings and designs that have received approval in writing and are verified by an approved party shall be considered in compliance with this code.

Reason: The last section is most important. It sets the stage for accrediting programs outside the code as at least as good as code. Some programs, such as RESNET's HERS are currently too proprietary to name in the code; however, they might be accredited, perhaps with restrictions, then that existing infrastructure can help deliver efficient homes. Just as important, there will be a variety of good programs that can help deliver energy efficiency. Some local, some national, some public, some private, some focused on specific types of homes, others broad; all can help. The code official does not have time to look at all the individual programs. We need a mechanism to accredit those programs or their energy efficient designs, This is a way to help deliver verified energy efficiency where this is acceptable to the code official. Code officials need a chance to catch their breath.

The "General" section lifts code text from the IRC to better describe the flexibility in the IECC.

In the middle section above, the IECC is made consistent with the I-code concept of potentially approving an alternative that is at least as good as the code, "meet or exceed", as in this change. It makes no sense to meet an alternative then go back and say to meet the code too, so the "mandatory" sentence was removed.

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

C102.1-EC-CONNER.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The proposal would remove mandatory requirements of this code. In addition, the committee believed the language of R102.2 to be open ended.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tim Ryan, International Association of Building Officials (IABO), Don Surrena, National Association of Home Builders, request Approval as Submitted.

Commenter's Reason: This proposal provides four significant fixes to the IECC. First, it modifies the General section to include the "alternate materials and methods" section from the IRC.

Second, it renames "Above Code" to "Alternate Programs"- the revised wording maintains that a building at least meet the energy efficiency required by the code. This wording still meets the intent of the IECC.

Third, mandatory requirements of this code should only be in effect for buildings using the performance path, not alternate programs. The initial reason that items were labeled as mandatory was that there was no performance trade-off such as HVAC controls and lighting requirements. Reputable alternate energy programs have their own way of dealing with these issues, and often more.

Fourth, additional criteria, "Accredited Programs," is specified in order to provide guidance to the authority having jurisdiction. This is a very important proposal to increase the adoptability, usability and enforceability of the IECC.

Public Comment 2:

Shaunna Mozingo, City of Cherry Village, CO, representing Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R102.1.1(N1101.7) Alternate programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to meet or exceed the energy efficiency required by this code. Buildings approved in writing in such an energy efficiency program shall be considered in compliance with this code. <u>The requirements identified as 'mandatory' in Chapter 4 shall be met.</u>

Commenter's Reason: At the Dallas hearings there were several Part I and Part II proposals that rendered different results because of the different committees hearing them. While it is understandable that in rare instances it is ok to have results be different for commercial verses residential, many of these items need to have the same requirement for both applications and we feel that this is one of those items.

We completely agreed with the committee's reason for approval in Part I, "While the code does provide the code official with the authority to approve alternate compliance methods, this proposal provides text which allows the code official to rely on the review and accreditation by others of equivalent or above code programs. This would be helpful to code officials and save their limited time. The text could help drive the development of accredited programs. Each such program provides flexibility for designers.".

However, we also agreed with some of the committee's reason for disapproval in Part II because the proponent had removed the language regarding mandatory requirements. We feel as though the modification brought that back and this proposal is an improvement to the existing code language, therefore we ask for approval as modified by this public comment, which brings the residential provisions in line with what happened in the commercial section.

CE29-13, Part II
Final Action: AS AM AMPC____ D

CE31-13, Part I
C102.1.1, R102.1.1 (IRC N1101.7)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org) and Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1.1 Above code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as "mandatory" in Chapter 4 shall be met.~~

Reason: (Surrena): The key element of an above code program is that it must meet or exceed the energy efficiency requirements of the IECC. Requiring such a program to also meet the detailed prescriptive requirements labeled as "mandatory" in the IECC defeats the purpose of performance based above code program. This code change proposal will allow flexibility in the methodology used for any above code program to meet or exceed the minimum energy efficiency requirements of the IECC.
(Conner): This change corrects the erroneous use of the term "*mandatory*". This moves the specification of what can be traded off with the performance approach into the code text about the performance approach, rather than spreading that information throughout the code, as was in energy codes prior to 2006.

The word "*shall*" and the concept of "*mandatory*" is woven throughout the I-codes. It is important that the energy code use "shall" correctly. The IRC definition is

***SHALL**. The term, when used in this code, is construed to mean "mandatory".*

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

C102.1.1-EC-CONNER-SURRENA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The text is essential to making sure above code programs meet the minimum of the 'mandatory' code provisions. This text was also retained in the committee's approval of CE29-13.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Don Surrena, CBO, National Association of Home Builders (NAHB), requests Approval as Submitted.

Commenter's Reason: The key element of an above code program is that it must meet or exceed the energy efficiency performance of the IECC. Requiring such a program to also meet the detailed prescriptive requirements labeled as "mandatory" in the IECC defeats the purpose of performance-based above code programs. This code change proposal will allow flexibility in the methodology used for any above code program to meet or exceed the minimum energy efficiency requirements of the IECC.

Mandatory requirements of this code should only be in effect for buildings using the performance path, not alternate programs. The initial reason that items were labeled as mandatory was that there was no performance trade-off such as HVAC controls and lighting requirements. Reputable alternate energy programs have their own way of dealing with these issues, and often more.

CE31-13, Part I
Final Action: AS AM AMPC____ D

CE31-13, Part II
C102.1.1, R102.1.1 (IRC N1101.7)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org) and Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1.1 (N1101.7) Above code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as "mandatory" in Chapter 4 shall be met.~~

Reason: (Surrena): The key element of an above code program is that it must meet or exceed the energy efficiency requirements of the IECC. Requiring such a program to also meet the detailed prescriptive requirements labeled as "mandatory" in the IECC defeats the purpose of performance based above code program. This code change proposal will allow flexibility in the methodology used for any above code program to meet or exceed the minimum energy efficiency requirements of the IECC.
(Conner): This change corrects the erroneous use of the term "*mandatory*". This moves the specification of what can be traded off with the performance approach into the code text about the performance approach, rather than spreading that information throughout the code, as was in energy codes prior to 2006.

The word "*shall*" and the concept of "*mandatory*" is woven throughout the I-codes. It is important that the energy code use "shall" correctly. The IRC definition is

SHALL*. The term, when used in this code, is construed to mean "mandatory".*

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

C102.1.1-EC-CONNER-SURRENA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The proposal would remove mandatory requirements of this code, which the committee believes are necessary to the approval of above code programs.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Don Surrena, CBO, National Association of Home Builders (NAHB), requests Approval as Submitted.

Commenter's Reason: The key element of an above code program is that it must meet or exceed the energy efficiency performance of the IECC. Requiring such a program to also meet the detailed prescriptive requirements labeled as "mandatory" in the IECC defeats the purpose of performance based above code program. This code change proposal will allow flexibility in the methodology used for any above code program to meet or exceed the minimum energy efficiency requirements of the IECC.

Mandatory requirements of this code should only be in effect for buildings using the performance path, not alternate programs. The initial reason that items were labeled as mandatory was that there was no performance trade-off such as HVAC controls and lighting requirements. Reputable alternate energy programs have their own way of dealing with these issues, and often more.

CE31-13, Part II

Final Action: AS AM AMPC____ D

CE32-13, Part I
C102.1.1, R102.1.1, (N1101.7)

Proposed Change as Submitted

Proponent: (Part I) Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1.1 Above code programs. The *code official* or other authority having jurisdiction shall be permitted to ~~deem~~ approve a national, state or local energy efficiency program as an additional method of demonstrating compliance with this code, provided that:

1. The program is administered by a party who is independent from the parties involved in the construction or ownership of the *building;*
2. A review of all program requirements is conducted;
3. Documentation and analysis shows that the requirements of this program ~~to~~ meet or exceed all of the energy efficiency requirements of ~~required by~~ this code; and
4. Program compliance is verified by a party who is independent from the parties involved in the construction or ownership of the *building*.

Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. Under such a program, the requirements identified as “mandatory” in Chapter 4 shall be met.

Reason: The purpose of the proposed code change is to establish new requirements for above code programs and to otherwise clarify the code. This proposal outlines specific criteria that must be applied in the determination of whether an alternative program is an “above code program” that may be allowed as a substitute for IECC compliance and code official enforcement.

Since section C102.1.1 allows buildings to opt out of local energy code compliance and enforcement (except as to mandatory measures) where they are approved by an “above code program,” there should be a high standard for such programs. The proposed changes ensure that any alternative program will have the following crucial elements:

- Third-party administration of the alternative program
- Requirements that meet or exceed the IECC requirements
- Documentation and analysis to support equivalence
- Independent verification of compliance

By contrast, the current language of section C102.1.1 gives no guidance to the authority having jurisdiction regarding how to determine whether a program is “above code” and should qualify as acceptable as an alternative compliance path. Given the recent flood of programs around the country that claim to be “above-code” and/or “green,” it is important that the IECC set the ground rules for how jurisdictions should evaluate these programs as alternatives to traditional code compliance and enforcement.

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

C102.1.1 #2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal did not provide any clarification to the code. The committee felt that first listed requirement would make the provisions too restrictive. The proponent acknowledged that the 3rd item was unclear and would need to be revised.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing Energy Efficient Codes Coalition, Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C102.1.1 Above code programs. The *code official* or other authority having jurisdiction shall be permitted to approve a national, state or local energy efficiency program as an additional method of demonstrating compliance with this code, provided that:

1. The program is administered by a party who is independent from the parties involved in the construction or ownership of the *building;*
2. A review of all program requirements is conducted;
3, Documentation and analysis shows that the requirements of this program ~~to~~ meet or exceed ~~all of~~ the energy efficiency ~~requirements~~ of this code; and
4. Program compliance is verified by a party who is independent from the parties involved in the construction or ownership of the *building*.

Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. Under such a program, the requirements identified as "mandatory" in Chapter 4 shall be met.

Commenter's Reason: We recommend approval of CE32, Part I, as modified by this public comment. The Residential Energy Committee approved CE32, Part II with a modification. While we believe that the original language of CE32, Part I is reasonable, we do not object to the approved modification to Part II. As a result, we propose that CE32, Part I, reflect the same modification. In this case, there is no good reason to create an inconsistency between the residential and commercial energy provisions of the IECC.

The original reason statement for CE32, Part I still applies, so we will not repeat it again here. This code change will clarify the standard that must be met by above code programs that may be approved as alternatives to compliance with the IECC and, in particular, establishes requirements that the program be administered and compliance be determined by entities independent from the builder or owner, which are crucial requirements considering that code official enforcement under this section has been replaced by enforcement by those who administer the above-code program.

CE32-13, Part I
Final Action: AS AM AMPC____ D

CE32-13, Part II
C102.1.1, R102.1.1, (N1101.7)

Proposed Change as Submitted

Proponent: (Part I) Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1.1 (N1101.7) Above code programs. The *code official* or other authority having jurisdiction shall be permitted to ~~deem~~ approve a national, state or local energy efficiency program as an additional method of demonstrating compliance with this code, provided that:

1. The program is administered by a party who is independent from the parties involved in the construction or ownership of the *building;*
2. A review of all program requirements is conducted;
3, Documentation and analysis shows that the requirements of this program ~~to~~ meet or exceed all of the energy efficiency requirements of ~~required by~~ this code; and
4. Program compliance is verified by a party who is independent from the parties involved in the construction or ownership of the *building*.

Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. Under such a program, the requirements identified as "mandatory" in Chapter 4 shall be met.

Reason: The purpose of the proposed code change is to establish new requirements for above code programs and to otherwise clarify the code. This proposal outlines specific criteria that must be applied in the determination of whether an alternative program is an "above code program" that may be allowed as a substitute for IECC compliance and code official enforcement.

Since section C102.1.1 allows buildings to opt out of local energy code compliance and enforcement (except as to mandatory measures) where they are approved by an "above code program," there should be a high standard for such programs. The proposed changes ensure that any alternative program will have the following crucial elements:

- Third-party administration of the alternative program
- Requirements that meet or exceed the IECC requirements
- Documentation and analysis to support equivalence
- Independent verification of compliance

By contrast, the current language of section C102.1.1 gives no guidance to the authority having jurisdiction regarding how to determine whether a program is "above code" and should qualify as acceptable as an alternative compliance path. Given the recent flood of programs around the country that claim to be "above-code" and/or "green," it is important that the IECC set the ground rules for how jurisdictions should evaluate these programs as alternatives to traditional code compliance and enforcement.

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

C102.1.1 #2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Modified**

Modify the proposal as follows:

3. Documentation and analysis shows that the requirements of this program to meet or exceed ~~all of~~ the energy efficiency ~~requirements~~ of this code; and

(Portions of proposal not shown remain unchanged)

Committee Reason: The proposal will provide some criteria for the code official to follow in approving above code programs. The modification was simply to remove language that could be incorrectly interpreted to mean that everything in the IECC is mandatory.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and because a public comment was submitted.

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, requests Disapproval

Commenter's Reason: At the Dallas hearings there were several Part I and Part II proposals that rendered different results because of the different committees hearing them. While it is understandable that in rare instances it is ok to have results be different for commercial verses residential, many of these items need to have the same requirement for both applications and we feel that this is one of those items.

We agree with the commercial energy committee and would expand on that reason statement for their disapproval in Part I by saying that Item 1 of this proposal is not needed. If I am an energy expert or a certified rater or a LEED qualified professional, etc, I now cannot administer the program on my own building? I have to hire someone else to administer the program? We can see having someone different verify the requirements as called out in Item 4, but I should be able to oversee and administer my own program on my own building as long as I meet all of the requirements.

Some of the wording is also unneeded because "approved" is a defined term in this code, thus a lot of what they are trying to say is already spelled out in the existing language.

CE32-13, Part II
Final Action: AS AM AMPC____ D

CE33-13, Part I
C102, C102.1.1 (NEW), R102, R102.1.1 (NEW)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

SECTION C102
~~ALTERNATE MATERIALS METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS~~
APPLICABILITY - DUTIES AND POWERS OF THE BUILDING OFFICIAL

C102.1.1 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

Reason: The proposed new Section R102.1.1 is the exact same language used in IRC Section 104.11, IBC Section 104.11, IFC Section 104.9, IMC Section 105.2, IPC Section 105.2, and IFGC Section 105.2 and this code change proposal is needed to correlate and be consistent with the other I-Codes.

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

C102.1.1 (NEW)-EC-SURRENA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee felt this additional text was unneeded. The activities described are part of administration of the code on daily basis.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC, request Approval as Modified by this Public Comment.

Revise the proposal as follows:

SECTION C102
APPLICABILITY - DUTIES AND POWERS OF THE ~~BUILDING~~ CODE OFFICIAL

~~**C102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~C102.1.1~~ C102.1 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. The *code official* shall be permitted to *approve* an ~~An~~ alternative material, design or method of construction ~~shall be approved~~ where the ~~building~~ *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ~~Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.~~

Commenter's Reason: We recommend approval of CE33, Part I, as modified by this public comment. The proposed language in CE33, Part I provides more specificity than the current code regarding the conditions for approval of the use of alternative materials and may be helpful to users of the IECC.

However, we propose to modify this language because the original language is likely to be confusing to users of the IECC and is inconsistent with the approach and defined terms in the IECC. In the IECC, "code official" is a defined term, but "building official" is not. Similarly, consistent with current IECC language (see current section C102.1.1) the code official should be "permitted to approve" the alternative material, ensuring that the code official can exercise discretion in this process.

Finally, and most importantly, it is unclear what "specific performance based provisions" are being referenced in the last sentence. Unlike other I-codes, the performance approach for the IECC is not contained in another code. It is found in the IECC itself (see section C401.2 and C405; in addition the IECC allows a performance approach under ASHRAE 90.1). We are concerned that code users may misinterpret the final sentence in the proposed Section C102, since the reference to "performance-based provisions" is not limited to energy performance, as is the IECC's performance approach. As a result, we believe that this language in the context of the energy code is far too broad, ambiguous and unnecessary and we recommend its deletion.

CE33-13, Part I
Final Action: AS AM AMPC____ D

CE33-13, Part II
C102, C102.1.1 (NEW), R102, R102.1.1 (NEW)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

SECTION R102
~~ALTERNATE MATERIALS—METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS~~
APPLICABILITY - DUTIES AND POWERS OF THE BUILDING OFFICIAL

R102.1.1 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

Reason: The proposed new Section R102.1.1 is the exact same language used in IRC Section 104.11, IBC Section 104.11, IFC Section 104.9, IMC Section 105.2, IPC Section 105.2, and IFGC Section 105.2 and this code change proposal is needed to correlate and be consistent with the other I-Codes.

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

C102.1.1 (NEW)-EC-SURRENA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: The proposal installs a provision that is consistent with other I-Codes.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and because public comments were submitted.

Public Comment 1:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC, request Approval as Modified by this Public Comment.

Revise the proposal as follows:

SECTION R102
APPLICABILITY - DUTIES AND POWERS OF THE ~~BUILDING~~ CODE OFFICIAL

~~**R102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**R102.1.1**~~ **R102.1 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. The *code official* shall be permitted to *approve* an ~~An~~ alternative material, design or method of construction ~~shall be approved~~ where the ~~building~~ *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ~~Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.~~

Commenter's Reason: We recommend approval of CE33, Part II, as modified by this public comment. The modification is necessary because the original language of the proposed code change is likely to be confusing to users of the IECC and is inconsistent with defined terms in the IECC. In the IECC, "code official" is a defined term, but "building official" is not. Similarly, consistent with current IECC language (see current section R102.1.1) the code official should be "permitted to approve" the alternative material, ensuring that the code official can exercise discretion in this process. Finally, and most importantly, it is unclear what "specific performance based provisions" are being referenced in the last sentence. Unlike other I-codes, the performance approach for the IECC is not contained in another code. It is found in the IECC itself (see section R401.2 and R405). We are concerned that code users may misinterpret the final sentence in the proposed Section R102, since the reference to "performance-based provisions" is not limited to energy performance, as is the IECC's performance approach. As a result, we believe that this language in the context of the energy code is far too broad, ambiguous and unnecessary and we recommend its deletion.

Public Comment 2:

Donald Vigneau, AIA, representing Northeast Energy Efficiency Partnerships Inc., requests Disapproval.

Commenter's Reason: OVERTURN THE RESIDENTIAL ENERGY CODE COMMITTEE RECOMMENDATION FOR APPROVAL AS SUBMITTED AND DISAPPROVE PART II CONSISTENT WITH THE COMMERCIAL ENERGY CODE COMMITTEE Part I ACTION.

This proposal intentionally duplicates Section R104.11 language and overrides Section 102.1.1 Alternative Energy Programs without any indication for whether the overridden language is deleted or relocated. Such language is inconsistent with a prior proposal on the same section successfully modified by CE29-Part 1 and will be brought forward for coordination. The original proposal and hearing testimony both leave unanswered the question of retention or deletion of the existing Above Code requirements. As such, the proposal comes to this hearing flawed, with many unanswered questions.

Inclusion of the language would add another administrative requirement to the residential requirements for a code that is already governed by the administrative provisions of the IRC and IBC respectively; it is duplicative and unnecessary. The report of the Commercial Energy Committee states:
Committee Reason: The committee felt this additional text was unneeded. The activities described are part of administration of the code on a daily basis.

CE33-13, Part II
Final Action: AS AM AMPC____ D

CE35-13, Part I

C103.2, C103.2.1 (NEW), C103.2.1.1 (NEW), C103.2.1.2 (NEW), C103.2.2 (NEW), C103.2.2.1 (NEW), C103.2.2.2 (NEW), C103.2.3 (NEW), C103.2.4 (NEW), C103.2.5 (NEW), C103.3, C104.2, C104.8, C202 (NEW), R103.2 (IRC N1101.8), R103.2.1 (NEW) (IRC N1101.8.1), R103.2.1.1 (NEW) (IRC N1101.8.1.1), R103.2.1.2 (NEW) (IRC N1101.8.1.2), R103.2.2 (NEW) (IRC N1101.8.2), R103.2.2.1 (NEW) (IRC N1101.8.2.1), C103.2.2.2 (NEW) (IRC N1101.L8.2.2), R103.2.3 (NEW) (IRC N1101.8.3), R103.2.4 (NEW) (IRC N1101.8.4), R103.2.5 (NEW) (IRC N1101.8.5), R103.3, R104.2, R104.8, R202 (NEW)

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C103.2 Information on construction documents. Construction documents ~~shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.~~ required for a building permit shall include a statement by one or more registered design professionals that the project design complies with or is exempt from this code, an *energy analysis* for the building design based on the chosen compliance strategy, the design itself, utilizing the specific energy values indicated by the *energy analysis*, a commissioning plan for mechanical and electrical systems where required and a description of the progress, commissioning and final inspections and tests required by this code for the project. Electronic media documents are permitted to be submitted when approved by the *code official*.

> **Exception:** Project designs that are entirely exempt in accordance with this code are not required to provide either the *energy analysis*, supporting design documentation, commissioning plan or inspections listing required by this code.

C103.2.1 Registered design professional statement of compliance or exemption. Construction documents submitted for a building permit shall include a statement by at least one registered design professional that the project design complies with or is exempt from this code. If the project design is exempt or partially exempt from this code, the citation shall be provided that allows the exemption.

C103.2.1.1 Statements of compliance or exemption. The statement of compliance shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is in compliance with this code." The statement of exemption shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is exempt from this code in accordance with Section . If the proposed work is partially exempt, the registered design professional shall use the statement of compliance and note the exempted work, providing the code citation allowing the exemption.

C103.2.1.2 Responsible registered design professional. If the project design team utilizes no energy trade-offs among design disciplines, each registered design professional of record may sign a statement of compliance with this code for the respective discipline. If the project design team utilizes energy trade-offs among design disciplines, at least one registered design professional shall sign the statement of compliance with this code for the entire project, including all disciplines.

C103.2.2 Energy analysis. The construction documents shall include an *energy analysis* showing the strategy for determining project design compliance with this code, and shall indicate the specific values for each unit of material, equipment and system that such analysis indicates must be met in the completed construction. The *code official* may require that the registered design professional show the values determined by the energy analysis in a table indicating, for each material, system or equipment type, the item, its required energy value, the citation from this code and the drawing reference where the item is drawn or described.

C103.2.2.1 Prescriptive approach. If the compliance strategy uses the prescriptive approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-2, or from provisions referenced in Section R401.2.

C103.2.2.2 Performance approach. If the compliance strategy uses the performance approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-3, or from provisions referenced in Section R405.

C103.2.3 Supporting design documentation. The construction documents shall indicate materials, systems and equipment for the proposed design as identified in the *energy analysis*, and shall specify the energy values determined by the analysis. Construction documents shall be fully coordinated and of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, materials, systems and equipment as herein governed. Details shall include as applicable, but are not limited to, envelope assembly U-factors; insulation materials and their R-values; fenestration areas, U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with input wattage, ballast type and control narrative; lighting power densities; and air sealing details for the *building thermal envelope* and penetrations through it.

C103.2.4 Commissioning plan. Where applicable, a commissioning plan shall be provided in the construction documents in accordance with Section C408. Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with such section. Copies of all documentation shall be made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

C103.2.5 Listing and description of required inspections and testing. The construction documents shall include a listing of the applicable progress, commissioning and final inspections and testing required by this code, when and how often each should be required in the project schedule, whether and what percentage of sampling will be permitted, applicable reference standards and the citation for the inspection or test.

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the ~~accompanying~~ construction documents and shall ascertain whether the proposed construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

C10402. Required approvals. Required inspections and testing shall be as provided in the approved construction documents, in accordance with Section C103.2.5. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.

C104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code as described in the *approved energy analysis*, a notice of approval shall be issued by the *code official*.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

ENERGY ANALYSIS. An analysis of this code as it affects a proposed building design, using the prescriptive or performance approach in conjunction with mandatory values, that results in the required values for each energy-related material, equipment or system in the construction. The energy analysis identifies whether the design team is using the International Energy Conservation Code or ANSI/ASHRAE/IESNA Standard 90.1 for compliance and, if applicable, where trade-offs are used.

Reason: The text added by this proposal establishes a protocol for what is required of the registered design professional to show compliance. This protocol identifies compliance or exemption; how the energy values were derived, what code or standard is being used and whether the prescriptive or performance path is being followed; what is required in construction documents to show that the appropriate values are being specified for construction; and the commissioning and inspections program by which the construction will be inspected, tested and evaluated. In addition, it provides guidance on how to state compliance when there are trade-offs among the envelope, mechanical and electrical systems.

Cost Impact: The code change proposal will not increase the cost of construction. Registered design professionals should already be providing the information required herein in some format; this proposal articulates the compliance process and sets a standard for code officials to evaluate.

C103.2-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee felt the proposal would add too much detail to the code regarding the review of construction documents submitted in a permit application as well as the inspection process. Each jurisdiction needs to be able to construct their program within the broad parameters currently provided in the code. The committee felt it is inappropriate to have the design professional determine the inspections to be made.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C103.1 General. [Unchanged]

C103.2 Information on construction documents. Construction documents ~~shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.~~ required for a building permit shall include the following:

1. A statement by one or more registered design professionals that the project design complies with or is exempt from this code;
2. An *energy analysis* for the new building or alteration design based on the chosen compliance strategy;
3. The design itself, utilizing the specific energy values indicated by the *energy analysis*;
4. A commissioning plan for mechanical and electrical systems where required; and
5. A description of the progress, commissioning and final inspections and tests required by this code for the project.

Electronic media documents are permitted to be submitted when approved by the *code official*.

Exception: Project designs that are entirely exempt in accordance with this code are not required to provide either the *energy analysis*, supporting design documentation, commissioning plan or inspections listing required by this code.

C103.2.1 Registered design professional statement of compliance or exemption. Construction documents submitted for a building permit shall include a statement by at least one registered design professional that the project design complies with or is exempt from this code. If the project design is exempt or partially exempt from this code, the citation shall be provided that allows the exemption.

C103.2.1.1 Statements of compliance or exemption. The statement of compliance shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this new building or alteration application is in compliance with this code." The statement of exemption shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this new building or alteration application is exempt from this code in accordance with Section [provide citation]." If the proposed work is partially exempt, the registered design professional shall use the statement of compliance and note the exempted work, providing the code citation allowing the exemption.

C103.2.1.2 Responsible registered design professional. If the project design team utilizes no energy trade-offs among design disciplines, each registered design professional of record may sign a statement of compliance with this code for the respective discipline. If the project design team utilizes energy trade-offs among design disciplines, at least one registered design professional shall sign the statement of compliance with this code for the entire project, including all disciplines.

C103.2.2 Energy analysis. The construction documents shall include an *energy analysis* showing the strategy for determining project design compliance with this code, and shall indicate the specific values for each unit of material, equipment and system that such analysis indicates must be met in the completed construction. The *code official* may require that the registered design professional show the values determined by the energy analysis in a table indicating, for each material, system or equipment type, the item, its required energy value, the citation from this code and the drawing reference where the item is drawn or described.

C103.2.2.1 Prescriptive approach. If the compliance strategy uses the prescriptive approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-2.

C103.2.2.2 Performance approach. If the compliance strategy uses the performance approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-3.

C103.2.3 Supporting design documentation. The construction documents shall indicate materials, systems and equipment for the proposed design as identified in the *energy analysis*, and shall specify the energy values determined by the analysis. Construction documents shall be fully coordinated and of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, materials, systems and equipment as herein governed. Details shall include as applicable, but are not limited to, envelope assembly U-factors; insulation materials and their R-values; fenestration areas, U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with input wattage, ballast type and control narrative; lighting power densities; and air sealing details for the *building thermal envelope* and penetrations through it.

C103.2.4 Commissioning plan. Where applicable, a commissioning plan shall be provided in the construction documents in accordance with Section C408. Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with such section. Copies of all documentation shall be made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

C103.2.5 Listing and description of required inspections and testing. The construction documents shall include a listing of the applicable progress, commissioning and final inspections and testing required by this code, when and how often each should be required in the project schedule, whether and what percentage of sampling will be permitted, applicable reference standards and the citation for the inspection or test.

C103.3 Examination of documents. The code official shall examine or cause to be examined the ~~accompanying~~ construction documents and shall ascertain whether the proposed construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

[Remaining text in Section 103 unchanged]

C104.2 Required approvals. Required inspections and testing shall be as provided in the *approved* construction documents, in accordance with Section C103.2.5. Work shall not be done.... [*remainder of Section 104.2 unchanged*]

C104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code and as described in the *approved energy analysis*, a notice of approval shall be issued by the *code official*.

C202
GENERAL DEFINITIONS

ENERGY ANALYSIS. A method for estimating the annual energy use of the proposed design and standard reference design based on estimates of energy use. The analysis shows how the design team, using the prescriptive or performance approach in conjunction with mandatory values, has determined the requisite values for each energy-related material, equipment or system in the construction that together will enable the proposed design to use less energy annually than the standard reference design. The energy analysis identifies whether the design team is using the International Energy Conservation Code or ANSI/ASHRAE/IESNA Standard 90.1 for compliance and, if applicable, where trade-offs are used.

Commenter's Reason: This proposal sets forth a protocol for construction drawings and inspections that will guide practitioners and will assist code officials in sifting through the various methods of arriving at code compliance, including prescriptive or performance, area-weighted calculations, trade-offs and the complexity of mechanical and lighting systems including their controls. The protocol includes a set of steps of presentation of the design (professional statement, energy analysis, supporting documentation) and requires the professional, or residential applicant, to identify what inspections are required to ensure compliance of the construction with the design documents. The energy code is complex, and these procedures, which are used in New York City, effectively guide architect, engineer, contractor, design-builder and code official to a set of information about the design that they can evaluate and discuss. In accordance with the Technical Committee's comments in the Code Development Hearing, "or applicant" has been added to the Residential Provisions in Part II each time "registered design professional" is used in order to accommodate jurisdictions that do not require licensed professionals to perform the design.

CE35-13, Part II

Final Action: AS AM AMPC____ D

CE35-13, Part II

C103.2, C103.2.1 (NEW), C103.2.1.1 (NEW), C103.2.1.2 (NEW), C103.2.2 (NEW), C103.2.2.1 (NEW), C103.2.2.2 (NEW), C103.2.3 (NEW), C103.2.4 (NEW), C103.2.5 (NEW), C103.3, C104.2, C104.8, C202 (NEW), R103.2 (IRC N1101.8), R103.2.1 (NEW) (IRC N1101.8.1), R103.2.1.1 (NEW) (IRC N1101.8.1.1), R103.2.1.2 (NEW) (IRC N1101.8.1.2), R103.2.2 (NEW) (IRC N1101.8.2), R103.2.2.1 (NEW) (IRC N1101.8.2.1), C103.2.2.2 (NEW) (IRC N1101.L8.2.2), R103.2.3 (NEW) (IRC N1101.8.3), R103.2.4 (NEW) (IRC N1101.8.4), R103.2.5 (NEW) (IRC N1101.8.5), R103.3, R104.2, R104.8, R202 (NEW)

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R103.2 (N1101.8) Information on construction documents. Construction documents ~~shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.~~ required for a building permit shall include a statement by one or more registered design professionals that the project design complies with or is exempt from this code, an *energy analysis* for the building design based on the chosen compliance strategy, the design itself, utilizing the specific energy values indicated by the *energy analysis*, a commissioning plan for mechanical and electrical systems where required and a description of the progress, commissioning and final inspections and tests required by this code for the project. Electronic media documents are permitted to be submitted when approved by the *code official*.

> **Exception:** Project designs that are entirely exempt in accordance with this code are not required to provide either the *energy analysis*, supporting design documentation, commissioning plan or inspections listing required by this code.

R103.2.1 (N1101.8.1) Registered design professional statement of compliance or exemption. Construction documents submitted for a building permit shall include a statement by at least one registered design professional that the project design complies with or is exempt from this code. If the project design is exempt or partially exempt from this code, the citation shall be provided that allows the exemption.

R103.2.1.1 (N1101.8.1.1)Statements of compliance or exemption. The statement of compliance shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is in compliance with this code." The statement of exemption shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is exempt from this code in accordance with Section ___. If the proposed work is partially exempt, the registered design professional shall use the statement of compliance and note the exempted work, providing the code citation allowing the exemption.

R103.2.1.2 (N1101.8.1.2) Responsible registered design professional. If the project design team utilizes no energy trade-offs among design disciplines, each registered design professional of record may sign a statement of compliance with this code for the respective discipline. If the project design team utilizes energy trade-offs among design disciplines, at least one registered design professional shall sign the statement of compliance with this code for the entire project, including all disciplines.

R103.2.2 (N1101.8.2) Energy analysis. The construction documents shall include an *energy analysis* showing the strategy for determining project design compliance with this code, and shall indicate the specific values for each unit of material, equipment and system that such analysis indicates must be met in the completed construction. The *code official* may require that the registered design professional show the values determined by the energy analysis in a table indicating, for each material, system or equipment type, the item, its required energy value, the citation from this code and the drawing reference where the item is drawn or described.

R103.2.2.1 (N1101.8.2.1) (Prescriptive approach. If the compliance strategy uses the prescriptive approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-2, or from provisions referenced in Section R401.2.

R103.2.2.2 (N1101.8.2.2) Performance approach. If the compliance strategy uses the performance approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-3, or from provisions referenced in Section R405.

R103.2.3 (N1101.8.3) Supporting design documentation. The construction documents shall indicate materials, systems and equipment for the proposed design as identified in the *energy analysis*, and shall specify the energy values determined by the analysis. Construction documents shall be fully coordinated and of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, materials, systems and equipment as herein governed. Details shall include as applicable, but are not limited to, envelope assembly U-factors; insulation materials and their R-values; fenestration areas, U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with input wattage, ballast type and control narrative; lighting power densities; and air sealing details for the *building thermal envelope* and penetrations through it.

R103.2.4 (N1101.8.4) Commissioning plan. Where applicable, a commissioning plan shall be provided in the construction documents in accordance with Section C408. Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with such section. Copies of all documentation shall be made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

R103.2.5 (N1101.8.5) Listing and description of required inspections and testing. The construction documents shall include a listing of the applicable progress, commissioning and final inspections and testing required by this code, when and how often each should be required in the project schedule, whether and what percentage of sampling will be permitted, applicable reference standards and the citation for the inspection or test.

R103.3 Examination of documents. The code official shall examine or cause to be examined the ~~accompanying~~ construction documents and shall ascertain whether the proposed construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

R104.2 Required approvals. Required inspections and testing shall be as provided in the *approved* construction documents, in accordance with Section C103.2.5. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.

R104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code as described in the *approved energy analysis*, a notice of approval shall be issued by the *code official*.

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

ENERGY ANALYSIS. An analysis of this code as it affects a proposed building design, using the prescriptive or performance approach in conjunction with mandatory values, that results in the required values for each energy-related material, equipment or system in the construction. The energy analysis identifies whether the design team is using the International Energy Conservation Code or ANSI/ASHRAE/IESNA Standard 90.1 for compliance and, if applicable, where trade-offs are used.

Reason: The text added by this proposal establishes a protocol for what is required of the registered design professional to show compliance. This protocol identifies compliance or exemption; how the energy values were derived, what code or standard is being used and whether the prescriptive or performance path is being followed; what is required in construction documents to show that the appropriate values are being specified for construction; and the commissioning and inspections program by which the construction will be inspected, tested and evaluated. In addition, it provides guidance on how to state compliance when there are trade-offs among the envelope, mechanical and electrical systems.

Cost Impact: The code change proposal will not increase the cost of construction. Registered design professionals should already be providing the information required herein in some format; this proposal articulates the compliance process and sets a standard for code officials to evaluate.

C103.2-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: This implies that a Registered Design Professional always be involved in the construction. This would require an RDP to state that an RDP is not required. The provisions are not necessary.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R103.1 General. [Unchanged]

R103.2 Information on construction documents. Construction documents ~~shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.~~ required for a building permit shall include the following:

1. A statement by one or more registered design professionals, or applicant, that the project design complies with or is exempt from this code;
2. An *energy analysis* for the new building or alteration design based on the chosen compliance strategy;
3. The design itself, utilizing the specific energy values indicated by the *energy analysis*; and
4. A description of the progress and final inspections and tests required by this code for the project.

Electronic media documents are permitted to be submitted when approved by the *code official*.

> **Exception:** Project designs that are entirely exempt in accordance with this code are not required to provide either the *energy analysis*, supporting design documentation or inspections listing required by this code.

R103.2.1 Registered design professional, or other applicant, statement of compliance or exemption. Construction documents submitted for a building permit shall include a statement by at least one registered design professional, or the applicant, that the project design complies with or is exempt from this code. If the project design is exempt or partially exempt from this code, the citation shall be provided that allows the exemption.

R103.2.1.1 Statements of compliance or exemption. The statement of compliance shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this new building or alteration application is in compliance with this code." The statement of exemption shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this new building or alteration application is exempt from this code in accordance with Section [provide citation]." If the proposed work is partially exempt, the registered design professional, or applicant, shall use the statement of compliance and note the exempted work, providing the code citation allowing the exemption.

R103.2.1.2 Responsible registered design professional, or applicant. If the project design team utilizes no energy trade-offs among design disciplines, each registered design professional of record, or applicant, may sign a statement of compliance with this code for the respective discipline. If the project design team utilizes energy trade-offs among design disciplines, at least one registered design professional, or applicant, shall sign the statement of compliance with this code for the entire project, including all disciplines.

R103.2.2 Energy analysis. The construction documents shall include an *energy analysis* showing the strategy for determining project design compliance with this code, and shall indicate the specific values for each unit of material, equipment and system that such analysis indicates must be met in the completed construction. The *code official* may require that the registered design professional, or applicant, show the values determined by the energy analysis in a table indicating, for each material, system or equipment type, the item, its required energy value, the citation from this code and the drawing reference where the item is drawn or described.

R103.2.2.1 Prescriptive approach. If the compliance strategy uses the prescriptive approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in Section R401.2.

R103.2.2.2 Performance approach. If the compliance strategy uses the performance approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in Section R405.

R103.2.3 Supporting design documentation. The construction documents shall indicate materials, systems and equipment for the proposed design as identified in the *energy analysis*, and shall specify the energy values determined by the analysis. Construction documents shall be fully coordinated and of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, materials, systems and equipment as herein governed. Details shall include as applicable, but are not limited to, envelope assembly U-factors; insulation materials and their R-values; fenestration areas, U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location;

schedule of lighting fixture lamping demonstrating 75% high-efficacy lamps; and air sealing details for the *building thermal envelope* and penetrations through it.

R103.2.4 Listing and description of required inspections and testing. The construction documents shall include a listing of the applicable progress and final inspections and testing required by this code, when and how often each should be required in the project schedule, whether and what percentage of sampling will be permitted, applicable reference standards and the citation for the inspection or test.

R103.3 Examination of documents. The code official shall examine or cause to be examined the ~~accompanying~~ construction documents and shall ascertain whether the proposed construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

[Remaining text in Section 103 unchanged]

R104.2 Required approvals. Required inspections and testing shall be as provided in the *approved* construction documents, in accordance with Section R103.2.4. Work shall not be done*.... [remainder of Section 104.2 unchanged*]

R104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code and as described in the *approved energy analysis*, a notice of approval shall be issued by the *code official*.

R202 (N1101.9)
GENERAL DEFINITIONS

ENERGY ANALYSIS. A method for estimating the annual energy use of the proposed design and standard reference design based on estimates of energy use. The analysis shows how the design team, using the prescriptive or performance approach in conjunction with mandatory values, has determined the requisite values for each energy-related material, equipment or system in the construction that together will enable the proposed design to use less energy annually than the standard reference design. The energy analysis identifies where trade-offs are used.

Commenter's Reason: This proposal sets forth a protocol for construction drawings and inspections that will guide practitioners and will assist code officials in sifting through the various methods of arriving at code compliance, including prescriptive or performance, area-weighted calculations, trade-offs and the complexity of mechanical and lighting systems including their controls. The protocol includes a set of steps of presentation of the design (professional statement, energy analysis, supporting documentation) and requires the professional, or residential applicant, to identify what inspections are required to ensure compliance of the construction with the design documents. The energy code is complex, and these procedures, which are used in New York City, effectively guide architect, engineer, contractor, design-builder and code official to a set of information about the design that they can evaluate and discuss. In accordance with the Technical Committee's comments in the Code Development Hearing, "or applicant" has been added to the Residential Provisions in Part II each time "registered design professional" is used in order to accommodate jurisdictions that do not require licensed professionals to perform the design.

CE35-13, Part II
Final Action: AS AM AMPC____ D

CE37-13, Part I
C103.2.1 (NEW), R103.2.1 (NEW)

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C103.2.1. Thermal envelope definition. The building's thermal envelope shall be defined on the construction documents as the alignment of the air barrier and insulation systems separating conditioned space from unconditioned space. Where it is not possible to define the alignment of the air barrier and thermal barrier systems on the construction documents inspection shall determine success of accomplishing this requirement.

Reason: The single most important energy and performance aspect of the home is the buildings thermal envelope and the alignment of the air barrier and thermal barrier systems. It is crucial that the design professional demonstrate an understanding of location of the thermal envelope and that they make an effort to draw its location so that the construction personnel can successfully implement the construction of the building in accordance with the code and the specifications that have been drawn. The air sealing details help make this possible but understanding where the details will be implemented helps ensure better implementation and enforcement.

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

C103.2.1 (NEW)-EC-SCHWARZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proponent requested disapproval in order to address issues raised by the Residential Energy Code Development Committee in its disapproval of the proposal.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C103.2.1. **Building thermal envelope depiction.** The building's thermal envelope shall be represented on the construction documents.

Commenter's Reason: Representing the building's thermal envelope on the construction documents ensures that the design professional of the building understands how the thermal envelope will separate conditioned space from unconditioned space. This is a crucial step in ensuring not only the energy efficiency of the building but also the safety, durability, and comfort created in the structure.

The simplification of the requirement allows for flexibility in how the building's thermal envelope is depicted but clearly forces the design professional to understand how what they are drawing will ultimately be constructed.

CE37-13, Part I

Final Action: AS AM AMPC____ D

CE37-13, Part II
C103.2.1 (NEW), R103.2.1 (NEW)

<u>Proposed Change as Submitted</u>

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

<u>**R103.2.1**. **Thermal envelope definition.** The building's thermal envelope shall be defined on the construction documents as the alignment of the air barrier and insulation systems separating conditioned space from unconditioned space. Where it is not possible to define the alignment of the air barrier and thermal barrier systems on the construction documents inspection shall determine success of accomplishing this requirement.</u>

Reason: The single most important energy and performance aspect of the home is the buildings thermal envelope and the alignment of the air barrier and thermal barrier systems. It is crucial that the design professional demonstrate an understanding of location of the thermal envelope and that they make an effort to draw its location so that the construction personnel can successfully implement the construction of the building in accordance with the code and the specifications that have been drawn. The air sealing details help make this possible but understanding where the details will be implemented helps ensure better implementation and enforcement.

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

C103.2.1 (NEW)-EC-SCHWARZ.doc

<u>Committee Action Hearing Results</u>

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: This is confusing language that would serve to make application of the code more difficult.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

<u>**R103.2.1**. **Thermal envelope depiction.** The building's thermal envelope shall be represented on the construction documents.</u>

Commenter's Reason: Representing the building's thermal envelope on the construction documents ensures that the design professional of the building understands how the thermal envelope will separate conditioned space from unconditioned space. This is a crucial step in ensuring not only the energy efficiency of the building but also the safety, durability, and comfort created in the structure.

The simplification of the requirement allows for flexibility in how the building's thermal envelope is depicted but clearly forces the design professional to understand how what they are drawing will ultimately be constructed.

CE37-13, Part II
Final Action: AS AM AMPC____ D

CE38-13, Part I

C103.3, C104.1, C104.2 (NEW), C104.3, C104.3.1 (NEW), C104.3.2 (NEW), C104.3.3 (NEW), C104.3.4 (NEW), C104.3.5 (NEW), C104.3.6 (NEW), C104.5, R103.3, R104.1, R104.2 (NEW), R104.3, R104.3.1 (NEW), R014.3.2 (NEW), R104.3.3 (NEW), R104.3.4 (NEW), R104.3.5 (NEW), R104.3.6 (NEW), R104.5

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. In causing the documents to be examined to verify compliance with this code, the *code official* shall be permitted to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

~~**C104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**C104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

C104.2 Preliminary Inspection. Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.

~~**C104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

C104.3 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections C104.3.1 through C104.3.6.

C104.3.1 Footing and foundation inspection. Inspections associated with footings and foundations shall be made before backfilling and shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications for:

1. Basement or crawl space walls having insulation applied exterior to or integral with the walls
2. Slabs on grade
3. Buried duct systems associated with HVAC systems
4. Piping systems associated with HVAC or service hot water systems
5. Freeze protection/snow melt systems.

C104.3.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration thermal properties (U-factor, SHGC and VT) and proper installation of fenestration, and air leakage controls as required by the code and approved plans and specifications for:

1. Opaque walls and wall assemblies
2. Floors and floor assemblies
3. Roof/ceilings and roof/ceiling assemblies
4. Fenestration
5. Required vestibules

C104.3.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. The R-value, location, thickness, depth of burial and protection of insulation on hot water piping
2. The existence of required temperature controls on potable hot water systems
3. The installation of automatic time switches on circulating hot water systems or heat trace
4. The installation of heat traps on hot water storage tanks associated with non-circulating systems.

C104.3.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Installed HVAC equipment type, efficiency and size
2. Installation of gravity and motorized dampers where required and leakage rates of the dampers
3. Installation of required demand control ventilation
4. Required insulation type, R-value, thickness and proper installation of insulation for ducts, plenums and piping associated with the HVAC system
5. Sealing and any required leakage testing of ducts and plenums
6. Installation of required economizers and associated controls
7. Installation of required temperature, humidity and zone controls
8. Required sizing of HVAC system fans and motors
9. Required energy recovery capability
10. Existence of a means to balance HVAC systems
11. Installation of required controls for HVAC and hydronic systems
12. Required limitations on hot gas bypass for cooling systems
13. Installation of radiant heating systems where not allowed

C104.3.5 Electrical rough-in inspection. Inspections at electrical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Proper installation of all required lighting controls
2. Installation of all lighting system components (fixtures and lamps)
3. Installation of individual electric meters for each dwelling unit in multi-family residential buildings.

C104.3.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* controls and their proper operation as well as documentation verifying the activities associated with required *building commissioning* have been conducted and the findings of non-compliance corrected. *Buildings*, or portions thereof, shall not be considered for a final inspection until the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report as required in Section C408.2.4.

~~**C104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

C104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Reason: This proposal improves and enhances the details governing inspections of construction and examination of documents associated with compliance verification.

The current provisions of Sections R 103.1 and C103.3 require the code official to examine the construction documents to verify compliance with the code. Those provisions also allow the code official to delegate that authority to another party (e.g., cause to be examined) but are not specific as to the qualifications of that party. Depending on the type and size of a residential or commercial building, the plans and specifications can be very complex and an appropriate level of review challenging for a jurisdiction that may not see many large commercial projects in a given year and/or have a unique or large residential building. Currently there is no specificity in the code about the qualifications of any third party reviewer, so the permittee could argue against the imposition of a registered design professional requirement by the jurisdiction. The proposed language makes it clear that, should the code official decide to delegate their authority to another party, such third party must be approved (a defined term in the code) by the code official; something very important because that party is acting on behalf of the code official.

The current provisions of Sections R104 and C104 covering inspections are not as specific as they could be with respect to energy efficiency. The proposed revisions to Sections R104 and C104, which are consistent with Section 109 of the International Existing Building Code (IEBC), provide the required detail to better ensure compliance with the code and through compliance delivery of the energy efficiency potential associated with the provisions of the code. It is important to point out that the provisions currently in Sections R104 and C104 are not being eliminated but instead enhanced.

- Sections R104.1 and C104.1 in the current code remain the same but have been enhanced to provide the additional detail provided in Section 109.1 of the IEBC, which is equally relevant to the IECC. In addition an allowance for the code official to have a designated agent conduct inspections has been added to recognize the ability for the code official should they so choose have a designated entity act on their behalf in conducting required inspections.
- New Sections R104.2 and C104.2 are added to the code and covers the issue of preliminary approvals. This provision appears for instance in the IEBC (109.2) and appears equally relevant to the IECC Residential and the IECC Commercial provisions.
- Sections R104.3 and C104.3 currently address a final inspection. There are, however, no provisions in the IECC that address the inspections that are necessary during the course of construction to ensure compliance with the IECC. The proposed Sections R104.3 and C104.3 include a provision for a final inspection but, as is the case in other ICC codes such as the IEBC (109), includes a number of other code-relevant inspections detailing by name what is to be assessed for compliance during key stages of construction. Having this direction, and notification to designers, builders and contractors via publication in the code, is intended to foster increased compliance with the IECC. Note also, as covered in the revisions to Sections R104.1 and C104.1, the code official can also have a designated agent conduct these inspections.
- Sections R104.5 and C104.5 as currently worded are circular in nature. They provide the code official certain authorization to accept reports from approved inspection agencies. The definition of the term approved is such that the end result of this criterion is that the code official is authorizing something based on his authority to authorize it. The proposed revisions provide the additional detail needed as to how approval of such third parties is to be addressed and the general criteria upon which they would be evaluated for acceptability.

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

C103.3-EC-WILLIAMS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The lists introduce confusion. Not all of the items listed are available for inspection at rough-in. The provision is overall too specific and doesn't allow the jurisdiction to determine its program based on available staffing.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent ~~laws~~ or ordinances. ~~In causing the documents to be examined to verify compliance with this code~~, The *code official* ~~shall be permitted~~ is authorized to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. ~~Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.~~ It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**C104.2 Preliminary Inspection.** Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.~~

C104.~~3~~ 2 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections ~~C104.3.1 through C104.3.6~~ C104.2.1 through 104.2.6.

~~**C104.3.1**~~ **C104.2.1 Footing and foundation inspection.** Inspections associated with footings and foundations ~~shall be made before backfilling and~~ shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications. ~~for:~~

1. ~~Basement or crawl space walls having insulation applied exterior to or integral with the walls~~
2. ~~Slabs on grade~~
3. ~~Buried duct systems associated with HVAC systems~~
4. ~~Piping systems associated with HVAC or service hot water systems~~
5. ~~Freeze protection/snow melt systems.~~

~~**C104.3.2**~~ **C104.2.2 Framing and rough-in inspection.** Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation~~,~~; fenestration ~~thermal~~ properties (U-factor, SHGC and VT) and proper installation ~~of fenestration,~~; and air leakage controls as required by the code and approved plans and specifications. ~~for:~~

1. ~~Opaque walls and wall assemblies~~
2. ~~Floors and floor assemblies~~

3. ~~Roof/ceilings and roof/ceiling assemblies~~
4. ~~Fenestration~~
5. ~~Required vestibules~~

~~**C104.3.3**~~ <u>**C104.2.3**</u> **Plumbing rough-in inspection.** Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications <u>as to types of insulation and corresponding R-values and protection, required controls and required heat traps.</u> ~~for:~~

1. ~~The R-value, location, thickness, depth of burial and protection of insulation on hot water piping~~
2. ~~The existence of required temperature controls on potable hot water systems~~
3. ~~The installation of automatic time switches on circulating hot water systems or heat trace~~
4. ~~The installation of heat traps on hot water storage tanks associated with non-circulating systems.~~

~~**C104.3.4**~~ <u>**C104.2.4**</u> **Mechanical rough-in inspection.** Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications <u>as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system and damper air leakage and required energy recovery and/or economizers.</u> ~~for:~~

1. ~~Installed HVAC equipment type, efficiency and size~~
2. ~~Installation of gravity and motorized dampers where required and leakage rates of the dampers~~
3. ~~Installation of required demand control ventilation~~
4. ~~Required insulation type, R-value, thickness and proper installation of insulation for ducts, plenums and piping associated with the HVAC system~~
5. ~~Sealing and any required leakage testing of ducts and plenums~~
6. ~~Installation of required economizers and associated controls~~
7. ~~Installation of required temperature, humidity and zone controls~~
8. ~~Required sizing of HVAC system fans and motors~~
9. ~~Required energy recovery capability~~
10. ~~Existence of a means to balance HVAC systems~~
11. ~~Installation of required controls for HVAC and hydronic systems~~
12. ~~Required limitations on hot gas bypass for cooling systems~~
13. ~~Installation of radiant heating systems where not allowed~~

~~**C104.3.5**~~ <u>**C104.2.5**</u> **Electrical rough-in inspection.** Inspections at electrical rough-in shall verify compliance as required by the code and *approved* plans and specifications <u>as to installed lighting systems, components and controls and installation of an electric meter for each dwelling unit.</u> ~~for:~~

1. ~~Proper installation of all required lighting controls~~
2. ~~Installation of all lighting system components (fixtures and lamps)~~
3. ~~Installation of individual electric meters for each dwelling unit in multi-family residential buildings.~~

~~**C104.3.6**~~ <u>**C104.2.6**</u> **Final inspection.** The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* controls and their proper operation as well as documentation verifying the activities associated with required *building commissioning* have been conducted and the findings of non-compliance corrected. *Buildings*, or portions thereof, shall not be considered for a final inspection until the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report as required in Section C408.2.4.

C104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Commenter's Reason: All this proposal and public comment do is make clear to both code officials and code users the types of inspections that should be expected. At the code development hearing there was considerable testimony in support of the code change proposal from city building departments as well as industry. Supporting testimony mentioned the value of and need for the reorganization provided in addition to the value of the detail provided regarding inspections. Points in opposition focused primarily on the depth of detail provided in the inspection criteria proposed.

No adverse comments were provided regarding examining of documents (e.g. allowing the code official to use approved third parties during this activity just as the code currently allows third parties to conduct inspections). The resulting language covering other than the inspection details shown in the public comment will simply better organize what is currently in the code. These changes are important. They will make it easier for code officials to ensure code compliance. More importantly they more clearly advise code users what to expect and what authority the code official has to ensure compliance.

Regarding inspections, points raised at the first hearing indicated that while the list of inspection items was good commentary and guidance, it went beyond the level of detail that belongs in Chapter 1 of the code. It was also noted that the inspections as outlined in the code change proposal were an unfunded mandate. In response, DOE noted that the inspection items listed came directly from the code, and their listing in Chapter 1 did not add any new criteria or change the current code requirements. As originally proposed, their delineation simply placed what is already required by the code in one location focused on inspections during construction. Whether listed in section 1 or not, the current code requires that compliance with the listed items be verified. It is clearer to have these expectations listed in one location, as opposed to trying to find them throughout the code.

DOE has further reviewed the current code, the code change proposal and the comments at the code development hearing. The current code does not provide sufficient detail for the code official or those responsible for compliance –Section C104.3

essentially provides for code officials to call for inspections when needed, with a final inspection completed before occupancy. DOE believes this is insufficient and does not give code officials what is needed for them to most effectively enforce the code. DOE does agree, however, that the original proposal may have been too detailed, and so has suggested a reduction in detail in this public comment.

- The proposed text associated with a preliminary inspection has been deleted – it is agreed that what was proposed could be construed as beyond the current scope of the energy code.
- The required inspections are retained, but the detail associated with each is significantly reduced. DOE agrees the detail originally provided may have been more appropriate for a commentary. DOE also recognizes that, as was stated at the code development hearing, adopting entities need more detail than is currently in the code in this area and often adopt amendments to the code. It seems more logical for the IECC to provide better guidance in the model code.
- The portion of the code change proposal covering a final inspection, however, has not been revised through this public comment, and remains as originally proposed. The current code simply says to provide a final inspection, but gives no detail about what is within the scope of the inspection.

Without this enhancement to the code regarding inspections, there is nothing in the code that the code official can reference when advising those who are required to comply what they need to do and can expect. Without this additional detail, the code official is powerless, at worst, to enforce compliance with the code, and, at best, has to debate the issue of inspections with those required to comply. DOE believes the appropriate level of detail is provided regarding inspections in this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE38-13, Part I

Final Action: AS AM AMPC____ D

CE38-13, Part II

C103.3, C104.1, C104.2 (NEW), C104.3, C104.3.1 (NEW), C104.3.2 (NEW), C104.3.3 (NEW), C104.3.4 (NEW), C104.3.5 (NEW), C104.3.6 (NEW), C104.5, R103.3, R104.1, R104.2 (NEW), R104.3, R104.3.1 (NEW), R014.3.2 (NEW), R104.3.3 (NEW), R104.3.4 (NEW), R104.3.5 (NEW), R104.3.6 (NEW), R104.5

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. In causing the documents to be examined to verify compliance with this code, the *code official* shall be permitted to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

~~**R104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

R104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**R104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

R104.2 Preliminary Inspection. Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.

~~**R104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

R104.3 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections R104.3.1 through R104.3.6.

R104.3.1 Footing and foundation inspection. Inspections associated with footings and foundations shall be made before backfilling and shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications for:

1. Basement or crawl space walls having insulation applied exterior to or integral with the walls
2. Slabs on grade
3. Buried duct systems associated with HVAC systems
4. Piping systems associated with HVAC or service hot water systems
5. Freeze protection/snow melt systems .

R104.3.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration thermal properties (U-factor and SHGC) and proper installation of fenestration, and air leakage controls as required by the code and approved plans and specifications for:

1. Opaque walls and wall assemblies
2. Floors and floor assemblies
3. Roof/ceilings and roof/ceiling assemblies
4. Fenestration

R104.3.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. The R-value, location, thickness, depth of burial and protection of insulation on hot water piping
2. The installation of automatic or manual switches on circulating hot water systems

R104.3.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Installed HVAC equipment type, efficiency and size
2. Installation of require programmable thermostats
3. Required heat pump supplementary heat controls
4. Installation of automatic or gravity dampers on outdoor air intakes and exhausts
5. Required insulation type, R-value, thickness and proper installation of insulation for ducts, air handlers and piping associated with the HVAC system
6. Sealing and any required leakage testing of ducts and plenums
7. Required sealing of and manufacturer's designation for air handlers
8. Required whole house ventilation and minimum fan efficacy

   Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.3.4.

R104.3.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* systesms, equipment and controls and their proper operation and the required number of high-efficacy lamps and fixtures.

~~**R104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

R104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Reason: This proposal improves and enhances the details governing inspections of construction and examination of documents associated with compliance verification.

The current provisions of Sections R 103.1 and C103.3 require the code official to examine the construction documents to verify compliance with the code. Those provisions also allow the code official to delegate that authority to another party (e.g., cause to be examined) but are not specific as to the qualifications of that party. Depending on the type and size of a residential or commercial building, the plans and specifications can be very complex and an appropriate level of review challenging for a jurisdiction that may not see many large commercial projects in a given year and/or have a unique or large residential building. Currently there is no specificity in the code about the qualifications of any third party reviewer, so the permittee could argue against the imposition of a registered design professional requirement by the jurisdiction. The proposed language makes it clear that, should the code official decide to delegate their authority to another party, such third party must be approved (a defined term in the code) by the code official; something very important because that party is acting on behalf of the code official.

The current provisions of Sections R104 and C104 covering inspections are not as specific as they could be with respect to energy efficiency. The proposed revisions to Sections R104 and C104, which are consistent with Section 109 of the International Existing Building Code (IEBC), provide the required detail to better ensure compliance with the code and through compliance delivery of the energy efficiency potential associated with the provisions of the code. It is important to point out that the provisions currently in Sections R104 and C104 are not being eliminated but instead enhanced.

- Sections R104.1 and C104.1 in the current code remain the same but have been enhanced to provide the additional detail provided in Section 109.1 of the IEBC, which is equally relevant to the IECC. In addition an allowance for the code official to have a designated agent conduct inspections has been added to recognize the ability for the code official should they so choose have a designated entity act on their behalf in conducting required inspections.
- New Sections R104.2 and C104.2 are added to the code and covers the issue of preliminary approvals. This provision appears for instance in the IEBC (109.2) and appears equally relevant to the IECC Residential and the IECC Commercial provisions.
- Sections R104.3 and C104.3 currently address a final inspection. There are, however, no provisions in the IECC that address the inspections that are necessary during the course of construction to ensure compliance with the IECC. The proposed Sections R104.3 and C104.3 include a provision for a final inspection but, as is the case in other ICC codes such as the IEBC (109), includes a number of other code-relevant inspections detailing by name what is to be assessed for compliance during key stages of construction. Having this direction, and notification to designers, builders and contractors via publication in the code, is intended to foster increased compliance with the IECC. Note also, as covered in the revisions to Sections R104.1 and C104.1, the code official can also have a designated agent conduct these inspections.
- Sections R104.5 and C104.5 as currently worded are circular in nature. They provide the code official certain authorization to accept reports from approved inspection agencies. The definition of the term approved is such that the end result of this criterion is that the code official is authorizing something based on his authority to authorize it. The proposed revisions provide the additional detail needed as to how approval of such third parties is to be addressed and the general criteria upon which they would be evaluated for acceptability.

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

C103.3-EC-WILLIAMS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: This amount of detail is not required in the code. This material would be good for a handbook or commentary.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. ~~In causing the documents to be examined to verify compliance with this code, the~~ The *code official* ~~shall be permitted~~ is authorized to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

R104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. ~~Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.~~ It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**R104.2 Preliminary Inspection.** Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.~~

~~**R104.3**~~ **R104.2 Required inspections.** The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections R104.2.1 through R104.2.5~~R104.3.1 through R104.3.6~~.

~~**R104.3.1**~~ **R104.2.1 Footing and foundation inspection.** Inspections associated with footings and foundations ~~shall be made before backfilling and~~ shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications. ~~for:~~

1. ~~Basement or crawl space walls having insulation applied exterior to or integral with the walls~~
2. ~~Slabs on grade~~
3. ~~Buried duct systems associated with HVAC systems~~
4. ~~Piping systems associated with HVAC or service hot water systems~~
5. ~~Freeze protection/snow melt systems .~~

~~**R104.3.2**~~ **R104.2.2 Framing and rough-in inspection.** Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration ~~thermal~~ properties (U-factor and SHGC) and proper installation ~~of fenestration~~, and air leakage controls as required by the code and approved plans and specifications. ~~for:~~

1. ~~Opaque walls and wall assemblies~~
2. ~~Floors and floor assemblies~~
3. ~~Roof/ceilings and roof/ceiling assemblies~~
4. ~~Fenestration~~

~~**R104.3.3**~~ **R104.2.3 Plumbing rough-in inspection.** Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications as to types of insulation and corresponding R-values and protection, and required controls. ~~for:~~

1. ~~The R-value, location, thickness, depth of burial and protection of insulation on hot water piping~~
2. ~~The installation of automatic or manual switches on circulating hot water systems~~

~~**R104.3.4**~~ **R104.2.4 Mechanical rough-in inspection.** Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation, and minimum fan efficiency. ~~for:~~

1. ~~Installed HVAC equipment type, efficiency and size~~
2. ~~Installation of require programmable thermostats~~
3. ~~Required heat pump supplementary heat controls~~

~~1. Installation of automatic or gravity dampers on outdoor air intakes and exhausts~~
~~2. Required insulation type, R-value, thickness and proper installation of insulation for ducts, air handlers and piping associated with the HVAC system~~
~~3. Sealing and any required leakage testing of ducts and plenums~~
~~4. Required sealing of and manufacturer's designation for air handlers~~
~~5. Required whole house ventilation and minimum fan efficacy~~

Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.3.4.

~~**R104.3.6**~~ **R104.2.5 Final inspection.** The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* systems, equipment and controls and their proper operation and the required number of high-efficacy lamps and fixtures.

R104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Commenter's Reason: All this proposal and public comment do is make clear to both code officials and code users the types of inspections that should be expected. At the code development hearing there was considerable testimony in support of the code change proposal from city building departments as well as industry. Supporting testimony mentioned the value of and need for the reorganization provided in addition to the value of the detail provided regarding inspections. Points in opposition focused primarily on the depth of detail provided in the inspection criteria proposed.

No adverse comments were provided regarding examining of documents (e.g. allowing the code official to use approved third parties during this activity just as the code currently allows third parties to conduct inspections). The resulting language covering other than the inspection details shown in the public comment will simply better organize what is currently in the code. These changes are important. They will make it easier for code officials to ensure code compliance. More importantly they more clearly advise code users what to expect and what authority the code official has to ensure compliance.

Regarding inspections, points raised at the first hearing indicated that while the list of inspection items was good commentary and guidance, it went beyond the level of detail that belongs in Chapter 1 of the code. It was also noted that the inspections as outlined in the code change proposal were an unfunded mandate. In response, DOE noted that the inspection items listed came directly from the code, and their listing in Chapter 1 did not add any new criteria or change the current code requirements. As originally proposed, their delineation simply placed what is already required by the code in one location focused on inspections during construction. Whether listed in section 1 or not, the current code requires that compliance with the listed items be verified. It is clearer to have these expectations listed in one location, as opposed to trying to find them throughout the code.

DOE has further reviewed the current code, the code change proposal and the comments at the code development hearing. The current code does not provide sufficient detail for the code official or those responsible for compliance –Section C104.3 essentially provides for code officials to call for inspections when needed, with a final inspection completed before occupancy. DOE believes this is insufficient and does not give code officials what is needed for them to most effectively enforce the code. DOE does agree, however, that the original proposal may have been too detailed, and so has suggested a reduction in detail in this public comment.

- The proposed text associated with a preliminary inspection has been deleted – it is agreed that what was proposed could be construed as beyond the current scope of the energy code.
- The required inspections are retained, but the detail associated with each is significantly reduced. DOE agrees the detail originally provided may have been more appropriate for a commentary. DOE also recognizes that, as was stated at the code development hearing, adopting entities need more detail than is currently in the code in this area and often adopt amendments to the code. It seems more logical for the IECC to provide better guidance in the model code.
- The portion of the code change proposal covering a final inspection, however, has not been revised through this public comment, and remains as originally proposed. The current code simply says to provide a final inspection, but gives no detail about what is within the scope of the inspection.

Without this enhancement to the code regarding inspections, there is nothing in the code that the code official can reference when advising those who are required to comply what they need to do and can expect. Without this additional detail, the code official is powerless, at worst, to enforce compliance with the code, and, at best, has to debate the issue of inspections with those required to comply. DOE believes the appropriate level of detail is provided regarding inspections in this public comment.

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CE38-13, Part II

Final Action: AS AM AMPC____ D

CE39-13, Part I

C104.1.1 (NEW), C104.2.1 (NEW), C104.2.2 (NEW), C104.3 (NEW), C104.3.1 (NEW), C104.4, C104.5, C104.6, C104.7, C104.8, C104.8.1, R104.1.1 (NEW), R104.2.1 (NEW), R104.2.2 (NEW), R104.3 (NEW), R104.3.1 (NEW), R104.4, R104.5, R104.6, R104.7, R104.8, R104.8.1

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C104.1.1 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, including *approved* commissioning agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

C104.2.1 Inspection requests. It shall be the duty of the holder of the permit or the holder's duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C104.2.2 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

~~C104.3~~ C104.2.3 Final inspection. The building shall have a final inspection and not be occupied until approved.

C104.3 Notice of approval. After the prescribed tests and inspections, including but not limited to applicable commissioning tests and inspections as prescribed in Section C408, indicate that work complies in all respects with this code, and required documentation, including but not limited to the final commissioning report, has been accepted by the *code official*, a notice of approval shall be issued by the *code official*.

C104.3.1 Revocation. The *code official* is authorized to suspend or revoke in writing a notice of approval issued under the provisions of this code wherever the certificate has been issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

~~C104.4~~ C104.3.2 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

~~**C104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

~~**C104.6 Inspection requests.** It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.~~

~~**C104.7 Reinspection and testing.** Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.~~

~~**C104.8 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**C104.8.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~

Reason: The proposal better organizes this section and eliminates redundancy.

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

C104.1.1 (NEW)-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proponent requested disapproval based on issues identified during the consideration of CE39-13 Part II.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C104.1 General. *[Unchanged]*

C104.1.1 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, including *approved* commissioning agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

C104.2 Required approvals*.* *[Unchanged.]*

C104.2.1 Inspection requests. It shall be the duty of the holder of the permit or the holder's duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C104.2.2 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

~~C104.3~~ C104.2.3 Final inspection. The building shall have a final inspection and not be occupied until approved.

C104.3 Notice of approval. After the prescribed tests and inspections, including but not limited to applicable commissioning tests and inspections as prescribed in Section C408, indicate that work complies in all respects with this code, and required documentation, including but not limited to the final commissioning report, has been accepted by the *code official*, a notice of approval shall be issued by the *code official*.

C104.3.1 Revocation. The *code official* is authorized to suspend or revoke in writing a notice of approval issued under the provisions of this code wherever the certificate has been issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

~~C104.4~~ C104.3.2 Reinspection. A building shall be reinspected when determined necessary by the code official.

~~**C104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

~~**C104.6 Inspection requests.** It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.~~

~~**C104.7 Reinspection and testing.** Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.~~

~~**C104.8 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**C104.8.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~

Commenter's Reason: This proposal reorganizes, simplifies and clarifies the text in the 2012 IECC. It neither adds nor deletes content, but it does eliminate redundancy**.**

CE39-13, Part I

Final Action: AS AM AMPC____ D

CE39-13, Part II

C104.1.1 (NEW), C104.2.1 (NEW), C104.2.2 (NEW), C104.3 (NEW), C104.3.1 (NEW), C104.4, C104.5, C104.6, C104.7, C104.8, C104.8.1, R104.1.1 (NEW), R104.2.1 (NEW), R104.2.2 (NEW), R104.3 (NEW), R104.3.1 (NEW), R104.4, R104.5, R104.6, R104.7, R104.8, R104.8.1

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R104.1.1 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, including *approved* commissioning agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

R104.2.1 Inspection requests. It shall be the duty of the holder of the permit or the holder's duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R104.2.2 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

~~R104.3~~ R104.2.3 Final inspection. The building shall have a final inspection and not be occupied until approved.

R104.3 Notice of approval. After the prescribed tests and inspections, including but not limited to applicable commissioning tests and inspections as prescribed in Section C408, indicate that work complies in all respects with this code, and required documentation, including but not limited to the final commissioning report, has been accepted by the *code official*, a notice of approval shall be issued by the *code official*.

R104.3.1 Revocation. The *code official* is authorized to suspend or revoke in writing a notice of approval issued under the provisions of this code wherever the certificate has been issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

~~R104.4~~ R104.3.2 Reinspection. A building shall be reinspected when determined necessary by the *code official.*

~~**R104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

~~**R104.6 Inspection requests.** It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.~~

~~**R104.7 Reinspection and testing.** Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.~~

~~**R104.8 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**R104.8.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~

Reason: The proposal better organizes this section and eliminates redundancy.

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

C104.1.1 (NEW)-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: Disapproval was requested by the proponent.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R104.1 General. [Unchanged]

R104.1.1 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies provided such agencies satisfy the requirements as to qualifications and reliability.

R104.2 Required approvals. *[Unchanged.]*

R104.2.1 Inspection requests. It shall be the duty of the holder of the permit or the holder's duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R104.2.2 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing. *[Text unchanged]*

~~R104.3~~ R104.2.3 Final inspection. The building shall have a final inspection and not be occupied until approved.

R104.3 Notice of approval. After the prescribed tests and inspections indicate that work complies in all respects with this code, and required documentation has been accepted by the *code official*, a notice of approval shall be issued by the *code official*.

R104.3.1 Revocation. The *code official* is authorized to suspend or revoke in writing a notice of approval issued under the provisions of this code wherever the certificate has been issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

~~R104.4~~ R104.3.2 Reinspection. A building shall be reinspected when determined necessary by the code official.

~~**R104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

~~**R104.6 Inspection requests.** It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.~~

~~**R104.7 Reinspection and testing.** Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.~~

~~**R104.8 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.~~

~~**R104.8.1 Revocation.** The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~

Commenter's Reason: This proposal reorganizes, simplifies and clarifies the text in the 2012 IECC. It neither adds nor deletes content, but it does eliminate redundancy.

CE39-13, Part II

Final Action: AS AM AMPC____ D

CE40-13, Part I
C104.3.1 (NEW), R104.3.1 (NEW)

Proposed Change as Submitted

Proponent: Hope Medina, Cherry Hills Village, representing self (hmedina@coloradocode.net)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C104.3.1 Energy inspections. Requirements of this code shall pass inspection prior to issuance of a certificate of occupancy for the building. Inspections shall be performed by the code official or a third party approved by the code official.

Reason: We are requiring for more energy efficient buildings to be built, but we do not require for any type of energy inspections to be performed. With the Federal government's energy mandates that our current building practices must increase energy conservation we are needing alter our current point of view . Section 110.3 of the IBC and section 109 of the IRC state that certain inspections are required to be done prior to obtaining a Certificate of Occupancy. Currently there are no energy code requirements listed that must be verified, but they are tied to many financial requirements, utility incentives, and local, state, and federal tax credits or incentives. There becomes a time when we can no longer over look this omission, and jump into the fire to start requiring that energy inspections be performed.

An example of a current issue is as follows. A construction services company is designing and constructing a green community affordable senior living facilities as a 2 phase project. The jurisdiction it was being built in does not perform plan reviews or inspections under the IECC. The two buildings were designed under the 2006 International Codes. With current lending requirements they were not able to obtain financing for the entire project under one loan. The project was split into two phases with two different financial loans procured. When submitting the second phase for finance they were informed that the money loaned is requiring for the building to be energy star certified. Due to the jurisdiction not performing energy plan reviews or inspections it may cost the builder it's financing or increase their budget to become compliant.

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

C109.1.5-EC-MEDINA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: Clearly and specifically states that inspections are required. Clearly allows the code official to use third party inspectors.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Duan Jonlin, City of Seattle Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C104.3.1 Energy inspections. ~~Requirements of this code shall pass inspection prior to issuance of a certificate of occupancy for the building. Inspections shall be performed by the code official or a third party approved by the code official.~~ <u>The Certificate of Occupancy for a building shall not be issued unless the code official inspects the building or structure and finds no violations of the provisions of this code or other laws enforced by the code official.</u>

Commenter's Reason: We support the concept of this code provision, and request that the wording be modified for clarity. A "requirement" cannot technically be inspected. In addition, it is already clear in the code that inspections may be performed by the code official or some approved third party, so that additional language is not necessary.

CE40-13, Part I

Final Action: AS AM AMPC____ D

CE40-13, Part II
C104.3.1 (NEW), R104.3.1 (NEW)

Proposed Change as Submitted

Proponent: Hope Medina, Cherry Hills Village, representing self (hmedina@coloradocode.net)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R104.3.1 Energy inspections. Requirements of this code shall pass inspection prior to issuance of a certificate of occupancy for the building. Inspections shall be performed by the code official or a third party approved by the code official.

Reason: We are requiring for more energy efficient buildings to be built, but we do not require for any type of energy inspections to be performed. With the Federal government's energy mandates that our current building practices must increase energy conservation we are needing alter our current point of view . Section 110.3 of the IBC and section 109 of the IRC state that certain inspections are required to be done prior to obtaining a Certificate of Occupancy. Currently there are no energy code requirements listed that must be verified, but they are tied to many financial requirements, utility incentives, and local, state, and federal tax credits or incentives. There becomes a time when we can no longer over look this omission, and jump into the fire to start requiring that energy inspections be performed.

An example of a current issue is as follows. A construction services company is designing and constructing a green community affordable senior living facilities as a 2 phase project. The jurisdiction it was being built in does not perform plan reviews or inspections under the IECC. The two buildings were designed under the 2006 International Codes. With current lending requirements they were not able to obtain financing for the entire project under one loan. The project was split into two phases with two different financial loans procured. When submitting the second phase for finance they were informed that the money loaned is requiring for the building to be energy star certified. Due to the jurisdiction not performing energy plan reviews or inspections it may cost the builder it's financing or increase their budget to become compliant.

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

C109.1.5-EC-MEDINA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This clarifies that compliance with this code must be demonstrated prior to issuance of a certificate of occupancy.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Duan Jonlin, City of Seattle Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R104.3.1 Energy inspections. ~~Requirements of this code shall pass inspection prior to issuance of a certificate of occupancy for the building. Inspections shall be performed by the code official or a third party approved by the code official.~~ The Certificate of Occupancy for a building shall not be issued unless the code official inspects the building or structure and finds no violations of the provisions of this code or other laws enforced by the code official.

Commenter's Reason: We support the concept of this code provision, and request that the wording be modified for clarity. A "requirement" cannot technically be inspected. In addition, it is already clear in the code that inspections may be performed by the code official or some approved third party, so that additional language is not necessary.

CE40-13, Part II
Final Action: AS AM AMPC____ D

CE41-13, Part I

C104.5, C104.5.1 (NEW), C202 (NEW), R104.5, R104.5.1 (NEW), R202 (NEW) (IRC N1101.9 (NEW))

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C104.5 Approved ~~inspection~~ agencies. The *code official* ~~is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~ or other authority having jurisdiction shall be permitted to designate an *approved agency* to determine compliance with any, some or all requirements of this code. Such *approved agency* shall:

1. Administer all necessary tests, review all relevant construction documents, and conduct all required inspections related to any code requirement where such agency is providing certification of compliance.
2. Produce a written report addressing all tests, inspections, review and analysis conducted and certifying compliance with such specific requirements of this code.

C104.5.1 Standard for approved agencies. An *approved agency* shall be *approved* after the *code official* or other authority having jurisdiction has determined that the agency meets the applicable requirements. An *approved agency* shall provide all of the information necessary to make such a determination. An *approved agency* shall:

1. Be objective, competent and independent from all interested parties, including all contractors responsible for the work being inspected, and disclose possible conflicts of interest so that objectivity can be confirmed.
2. Have adequate equipment to perform any required test or inspections.
3. Employ experienced personnel educated and qualified to conduct the necessary review, tests, inspections and other actions to determine compliance.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved.*

Reason: The purpose of the proposed code change is to establish new requirements for *approved agencies* and to otherwise clarify the code -- this proposal will improve the potential for approved agencies to assist in code compliance and enforcement efforts. The proposal imports the definition of "approved agency" from the 2012 *IBC* into the *IECC*, clarifies the role of approved agencies in verifying aspects of energy code compliance and establishes standards for such agencies to be approved. The IECC currently does not give enough direction about the role of such approved agencies or the minimum requirements for these entities. This proposal improves the code by outlining the requirements for approved agencies, including:

- Third-party administration of the verification activities
- Quality and reliability of the approved agency
- Written reports of code compliance

These requirements are all common-sense and already may be employed by jurisdictions that delegate testing or inspection authority to third parties. We believe that it makes sense to include these requirements in the IECC so that jurisdictions can apply more uniform criteria to approved agencies, and so that third parties can better tailor their compliance and enforcement programs to meet the expectations of the state or locality.

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

Note: The term 'approved agency' is defined in other International Codes including IBC, IRC, IMC, IPC and IgCC. The definition proposed here is the same as that found in these other code.

C104.5-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee felt there were too many concerns regarding the text to consider approving it rather than keeping the current very clear and concise text. Requiring each agency to do 'all' of the tests, etc, was too encompassing and would prevent specialized agencies to conduct specific aspects. There was concern that this would expose testing agencies to inappropriate release of proprietary information.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C104.5 Approved agencies. The *code official* or other authority having jurisdiction shall be permitted to designate an *approved agency* to determine compliance with any, some or all requirements of this code. Such *approved agency* shall:

1. Administer ~~all~~ necessary tests, review ~~all~~ relevant construction documents, and conduct ~~all~~ required inspections related to any code requirement where such agency is *approved* to provide ~~providing~~ certification of compliance with the code requirement;~~.~~
2. Produce a written report detailing the results of ~~addressing all tests,~~ any inspections, review and analysis related to the code compliance requirements for the building ~~conducted~~; and
3. Certify ~~certifying~~ compliance with such specific requirements of this code.

C104.5.1 Standard for approved agencies. An *approved agency* shall be *approved* after the *code official* or other authority having jurisdiction has determined that the agency meets the applicable requirements. An *approved agency* shall provide all of the information necessary to make such a determination. An *approved agency* shall:

1. Be objective, competent and independent from all ~~interested~~ parties involved in the design, construction, ownership or operation of the building, including all contractors responsible for the work ~~being~~ to be inspected, and disclose possible conflicts of interest so that objectivity can be confirmed;~~.~~
2. Have adequate equipment to perform any required test or inspections;~~.~~ and
3. Employ experienced personnel educated and qualified to conduct the necessary review, tests, inspections and other actions to determine compliance.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: We recommend approval of CE41, Part I, as modified by this public comment. Although the original reason statement adequately outlines the reasons why the IECC should include these additional details on the role and responsibilities of an "approved agency," we have addressed concerns raised during the committee hearings:

- The modifications clarify that approved agencies may be approved for specific limited purpose.
- Similarly, reports are now specifically limited to building-specific inspections and analyses and would not apply to product certifications.
- Independence from "interested" parties has been clarified to specifically identify the parties from whom independence must be maintained – those involved in the design, construction, ownership or operation of the building.

CE41-13, Part I

Final Action: AS AM AMPC____ D

CE41-13, Part II

C104.5, C104.5.1 (NEW), C202 (NEW), R104.5, R104.5.1 (NEW), R202 (NEW) (IRC N1101.9 (NEW))

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R104.5 Approved ~~inspection~~ agencies. The *code official* ~~is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~ or other authority having jurisdiction shall be permitted to designate an *approved agency* to determine compliance with any, some or all requirements of this code. Such *approved agency* shall:

1. Administer all necessary tests, review all relevant construction documents, and conduct all required inspections related to any code requirement where such agency is providing certification of compliance.
2. Produce a written report addressing all tests, inspections, review and analysis conducted and certifying compliance with such specific requirements of this code.

R104.5.1 Standard for approved agencies. An *approved agency* shall be *approved* after the *code official* or other authority having jurisdiction has determined that the agency meets the applicable requirements. An *approved agency* shall provide all of the information necessary to make such a determination. An *approved agency* shall:

1. Be objective, competent and independent from all interested parties, including all contractors responsible for the work being inspected, and disclose possible conflicts of interest so that objectivity can be confirmed.
2. Have adequate equipment to perform any required test or inspections.
3. Employ experienced personnel educated and qualified to conduct the necessary review, tests, inspections and other actions to determine compliance.

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved.*

Reason: The purpose of the proposed code change is to establish new requirements for *approved agencies* and to otherwise clarify the code -- this proposal will improve the potential for approved agencies to assist in code compliance and enforcement efforts. The proposal imports the definition of “approved agency” from the 2012 *IBC* into the *IECC*, clarifies the role of approved agencies in verifying aspects of energy code compliance and establishes standards for such agencies to be approved. The IECC currently does not give enough direction about the role of such approved agencies or the minimum requirements for these entities. This proposal improves the code by outlining the requirements for approved agencies, including:

- Third-party administration of the verification activities
- Quality and reliability of the approved agency
- Written reports of code compliance

These requirements are all common-sense and already may be employed by jurisdictions that delegate testing or inspection authority to third parties. We believe that it makes sense to include these requirements in the IECC so that jurisdictions can apply more uniform criteria to approved agencies, and so that third parties can better tailor their compliance and enforcement programs to meet the expectations of the state or locality.

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

Note: The term 'approved agency' is defined in other International Codes including IBC, IRC, IMC, IPC and IgCC. The definition proposed here is the same as that found in these other code.

C104.5-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: This expands the code requirements beyond the original intent of this section, and is unnecessary. This also causes problems in areas where some flexibility is needed, such as small jurisdictions where testing agencies might not be easily attained, and testing might be appropriately performed by the HVAC Contractor.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc. , request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R104.5 Approved agencies. The *code official* or other authority having jurisdiction shall be permitted to designate an *approved agency* to determine compliance with any, some or all requirements of this code. Such *approved agency* shall:

1. Administer ~~all~~ necessary tests, review ~~all~~ relevant construction documents, and conduct ~~all~~ required inspections related to any code requirement where such agency is *approved* to provide ~~providing~~ certification of compliance with the code requirement;~~.~~
2. Produce a written report detailing the results of ~~addressing all tests,~~ any inspections, review and analysis related to the code compliance requirements for the building ~~conducted~~; and
3. Certify ~~certifying~~ compliance with such specific requirements of this code.

R104.5.1 Standard for approved agencies. An *approved agency* shall be *approved* after the *code official* or other authority having jurisdiction has determined that the agency meets the applicable requirements. An *approved agency* shall provide all of the information necessary to make such a determination. An *approved agency* shall:

1. Be objective, competent and independent from all ~~interested~~ parties involved in the design, construction, ownership or operation of the building, including all contractors responsible for the work ~~being~~ to be inspected, and disclose possible conflicts of interest so that objectivity can be confirmed; ~~.~~
2. Have adequate equipment to perform any required test or inspections; and ~~.~~
3. Employ experienced personnel educated and qualified to conduct the necessary review, tests, inspections and other actions to determine compliance.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: We recommend approval of CE41, Part II, as modified by this public comment. Although the original reason statement adequately outlines the reasons why the IECC should include these additional details on the role and responsibilities of an "approved agency," we have addressed concerns raised during the committee hearings:

- The modifications clarify that approved agencies may be approved for specific limited purpose.
- Similarly, reports are now specifically limited to building-specific inspections and analyses and would not apply to product certifications.
- Independence from "interested" parties has been clarified to specifically identify the parties from whom independence must be maintained – those involved in the design, construction, ownership or operation of the building.

CE41-13, Part II

Final Action: AS AM AMPC____ D

CE42-13
C106.1.2, C106.2

Proposed Change as Submitted

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

C106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

> **Exception.** Where using ANSI/ASHRAE/IESNA 90.1 as a compliance path as allowed in Section C401.2 Item 1 or Section C401.2.1 Item 2.

~~**C106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Adding the exception to C106.1.2 clarifies the intent in Section C401.2 that commercial buildings shall comply with either ANSI/ASHRAE/IESNA 90.1in its entirety or the requirements of the IECC Sections in its entirety.

Section C106.2 is unnecessary as it simply restates the requirements in C106.1.1 and C106.1.2 and adds confusion in which section to cite.

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

C106.1.2-EC-ELLIS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee found the language of the proposal confusing. It doesn't add any clarity not provided by the current text.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shirley Ellis, Energy Systems Laboratory, Texas A&M University System, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

> **Exception.** ~~Where using ANSI/ASHRAE/IESNA 90.1 as a compliance path as allowed in Section C401.2 Item 1 or Section C401.2.1 Item 2.~~ Where ANSI/ASHRAE/IESNA 90.1 is used as the compliance path as allowed in Sections C401.2 and C401.2.1, the provisions of the standard take precedence over the provisions of Chapter C4.

Commenter's Reason: Adds an exception to C106.1.2. Section C401 states that the requirements contained in Chapter 4 are applicable to all commercial buildings and that said buildings shall comply with either ANSI/ASHRAE/IESNA 90.1 or the requirements of the IECC. This exception will allow the provisions of the standard to take precedence over the provisions of the code as they relate to Chapter 4 Commercial Energy Efficiency requirements when the ANSI/ASHRAE/IESNA 90.1 is the method of compliance.

One of the concerns voiced at the committee hearing was that this exception could be applied to other chapters and sections of the IECC. The added language in this modification address that concern. This exception specifically references Chapter 4 provisions and therefore does not apply to conflicts in the remaining chapters of the IECC.

CE42-13

Final Action: AS AM AMPC____ D

CE43-13, Part I
C106.2, R106.2

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED ONLY FOR INFORMATION PURPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Section C106.2 is redundant of Section C106.1.1.

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

C106.2-EC-TAYLOR.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC – Commercial
Committee Action: **Disapproved**

Committee Reason: The committee was unsure that the text was redundant and whether it was this text that needed to be removed, or the text in Section C106.1.1.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Approval as Submitted.

Commenter's Reason:

(Taylor): Sections C106.1.1 and C106.2 have the same meaning. Section C106.1.1 elaborates on Sections C106.1, along with an additional paragraph. Therefore standalone Section C106.2 is redundant and should be eliminated from the code. There is no Part II for this public comment as Part II was approved as submitted in the Code Development Hearing.

(Mozingo): At the Dallas hearings there were several Part I and Part II proposals that rendered different results because of the different committees hearing them. While it is understandable that in rare instances it is ok to have results be different for commercial verses residential, many of these items need to have the same requirement for both applications and we feel that this is one of those items.

We agree with the residential committee when they said that this was redundant language. The commercial committee said that they were confused over this issue and wondered if the language in 106.1.1 should be changed instead. Section 106.1.1 mentions conflicts between the energy code and both the provisions of other codes as well as referenced standards. Section 106.1.2 mentions the conflicts with referenced standards again. It seems as though everything is already covered in both of these sections so why do we need yet another section (106.2) to address standards again?

CE43-13, Part I

Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE43-13, PART II – IECC-RESIDENTIAL PROVISIONS

Delete without substitution as follows:

~~**R106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Section C106.2 is redundant of Section C106.1.1.

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

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This removes redundant language from the code.

Assembly Action: **None**

CE44-13, Part I
C108.4, R108.4

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine ~~of not less than {AMOUNT] dollars or more than [AMOUNT} dollars~~.as set by the applicable governing authority.

Reason: Codes are adopted in various ways by varying entities, federal agencies, states, counties, or municipalities. Often one level of government will adopt the code, while the enforcement is at a different level. Some of the adopting entities do not have the means to insert a specific fine amount, in some instances the enforcement may be by several entities that have fine amounts that vary and in some cases the fine amount may unknown to the adopting agency.

This proposal will also eliminate the need to amend the code ordinance when the fine structure is revised.
This change allows the code to be adopted without relying on the amount to be determined at the time of adoption.

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

C108.4-EC-ELLIS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: Simplifies adoption of the code. Often it is not code officials, or even the jurisdiction that sets fine amounts.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC; Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be ~~liable~~ subject to a fine as set by the applicable governing authority.

Commenter's Reason:
Mozingo: At the Dallas hearings there were several Part I and Part II proposals that rendered different results because of the different committees hearing them. While it is understandable that in rare instances it is ok to have results be different for commercial verses residential, many of these items need to have the same requirement for both applications and we feel that this is one of those items.

We agree with the modification that the residential committee made by changing the word "liable" to "subject" because liable could imply that if I hand a red tag to the laborer on site, he is liable for the fine, when he really may be subject to the fine but more likely his company is subject to the fine. Liable is too harsh of a word for this section. We would like to see consistency between residential and commercial provisions by bringing in the modification made by the residential proposal.

Thompson: Both parts of CE44 were approved, however, Part II was approved with a minor revision to the text – changing 'liable' to 'subject'. The SEHPCAC agrees with the overall intent of the change and believes that both parts of the code should read the same. The language approved in Part II is the better language for this 'legal' part of the code.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE44-13, Part I
Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE44-13, PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine ~~of not less than {AMOUNT] dollars or more than [AMOUNT} dollars.~~ as set by the applicable governing authority.

Reason: Codes are adopted in various ways by varying entities, federal agencies, states, counties, or municipalities. Often one level of government will adopt the code, while the enforcement is at a different level. Some of the adopting entities do not have the means to insert a specific fine amount, in some instances the enforcement may be by several entities that have fine amounts that vary and in some cases the fine amount may unknown to the adopting agency.

This proposal will also eliminate the need to amend the code ordinance when the fine structure is revised.
This change allows the code to be adopted without relying on the amount to be determined at the time of adoption.

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

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Modified**

Modify the proposal as follows:

R108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be ~~liable~~ subject to a fine as set by the applicable governing authority.

Committee Reason: This inset by the governing authority is often forgotten at the time of adoption. The language proposed accomplishes the intent of the code. The modification is simply to use language appropriate to the context.

Assembly Action: **None**

CE46-13, Part I
C202, R202 (IRC N1101.9)

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Part I – IECC - COMMERICAL

Revise definition as follows:

SECTION C202
GENERAL DEFINITIONS

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope <u>between conditioned space and unconditioned space, including necessary sealing to block air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage.</u> An air barrier may be a single material or a combination of materials <u>that are in continuous alignment throughout the 3D structure of the air barrier and the thermal barrier of the building. The air barrier system is constructed of materials that are impermeable to the movement of air and are strong and durable to perform throughout the serviceable life of the building. An interior and exterior continuous air barrier system is utilized and installed in alignment with all fibrous cavity insulation systems. i.e. six sided encapsulation is walls and floor systems.</u>

Reason: The air barrier system is a crucial element of the buildings structure in creation of efficient homes. If they it is not clearly defined then identification, implementation, and enforcement of the energy code will continue to be ambiguous. The language here is intended clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

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

C202-AIR BARRIER-EC-SCHWARZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The text of the proposed definition doesn't bring clarity to the meaning of air barrier. The proposal also brings a technical requirement into the definition. Technical provisions do not belong in definitions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION C202
GENERAL DEFINITIONS

AIR BARRIER. ~~Material(s)~~ Materials assembled and joined together to provide a barrier to air leakage ~~through the building envelope~~ between conditioned space and unconditioned space, including necessary sealing to block air flow at edges and seams and adequate support to resist air moving with positive and negative pressures from inside or outside the building from entering the building's thermal envelope ~~without displacement or damage~~. An air barrier ~~may be~~ is either a single material or is a combination of materials, which is installed on the interior of the building, on the exterior of the building , or on both the interior and exterior of the building, depending on the climate zone or the configuration of the building. ~~that are in continuous alignment throughout the 3D structure of the air barrier and the thermal barrier of the building~~ The air barrier system is constructed of materials that are impermeable to the movement of air, and are strong and durable to perform throughout the serviceable life of the building. ~~An interior and exterior~~ continuous air barrier system ~~is utilized and installed in alignment with all fibrous cavity insulation systems. i.e. six sided encapsulation is walls and floor systems~~.

Commenter's Reason: Air is like a freight train transporting energy, moisture and pollutants around the building and through the building's thermal envelope. Clearly understanding that the air barrier separates conditioned space from unconditioned space, that it must be durable and last the life of the house, and that it may not be on just one plain of the building is important. The code may not be intended to be a building manual but it is often used that way and promoting sound building science and building practices ensure not only efficiency but durability and safety in the building. The rewording of this proposal better demonstrates the intent by eliminating language that is ambiguous and unenforceable. Stating that the air barrier must be strong, durable, and last the serviceable life of the building further defines the types of material that can be used to construct the system. It belongs in the definition to demonstrate that although some material can stop the movement of air they are not suitable because they will not last over time.

CE46-13, Part I

Final Action: AS AM AMPC____ D

CE46-13, Part II
C202, R202 (IRC N1101.9)

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Part II – IECC - RESIDENTIAL

Revise definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope between conditioned space and unconditioned space, including necessary sealing to block air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. An air barrier may be a single material or a combination of materials that are in continuous alignment throughout the 3D structure of the air barrier and the thermal barrier of the building. The air barrier system is constructed of materials that are impermeable to the movement of air and are strong and durable to perform throughout the serviceable life of the building. An interior and exterior continuous air barrier system is utilized and installed in alignment with all fibrous cavity insulation systems. i.e. six sided encapsulation is walls and floor systems.

Reason: The air barrier system is a crucial element of the buildings structure in creation of efficient homes. If they it is not clearly defined then identification, implementation, and enforcement of the energy code will continue to be ambiguous. The language here is intended clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

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

C202-AIR BARRIER-EC-SCHWARZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: The proposed definition for air barrier is written with detail requirements that do not belong in a definition, In addition, the term "thermal barrier" is used, which is a term used in the building code for a flame resistant assembly.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

AIR BARRIER. ~~Material(s)~~ Materials assembled and joined together to provide a barrier to air leakage ~~through the building envelope~~ between conditioned space and unconditioned space, including necessary sealing to block air flow at edges and seams and adequate support to resist air moving with positive and negative pressures from inside or outside the building from entering the building's thermal envelope ~~without displacement or damage~~. An air barrier ~~may be~~ is either a single material or is a combination of materials, which is installed on the interior of the building, on the exterior of the building , or on both the interior and exterior of the building, depending on the climate zone or the configuration of the building. ~~that are in continuous alignment throughout the 3D structure of the air barrier and the thermal barrier of the building~~ The air barrier system is constructed of materials that are impermeable to the movement of air, and are strong and durable to perform throughout the serviceable life of the building. ~~An interior and exterior~~ continuous air barrier system ~~is utilized and installed in alignment with all fibrous cavity insulation systems. i.e. six sided encapsulation is walls and floor systems~~.

Commenter's Reason: Air is like a freight train transporting energy, moisture and pollutants around the building and through the building's thermal envelope. Clearly understanding that the air barrier separates conditioned space from unconditioned space, that it must be durable and last the life of the house, and that it may not be on just one plain of the building is important. The code may not be intended to be a building manual but it is often used that way and promoting sound building science and building practices ensure not only efficiency but durability and safety in the building. The rewording of this proposal better demonstrates the intent by eliminating language that is ambiguous and unenforceable. Stating that the air barrier must be strong, durable, and last the serviceable life of the building further defines the types of material that can be used to construct the system. It belongs in the definition to demonstrate that although some material can stop the movement of air they are not suitable because they will not last over time.

CE46-13, Part II

Final Action: AS AM AMPC____ D

CE48-13, Part I
C202, R202 (IRC N1101.9), IRC R202

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART I - IECC – COMMERCIAL PROVISIONS

Revise definition as follows:

SECTION C202
GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

Reason: The thermal envelope is a crucial elements of the buildings structure in creation of efficient homes. If it not clearly defined then identification of the thermal boundary and implementation and enforcement of the energy code will continue to be ambiguous. The language here is intended to clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

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

R202-BUILDING THERMAL ENVELOPE-EC-SCHWARZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee; Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Building Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal was related to CE37-13 which was also disapproved. The proposal needs additional clarity as the alignment suggested doesn't always occur.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION C202
GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. ~~The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.~~ Building assemblies that provide a continuous air barrier and thermal barrier separating conditioned space from unconditioned space.

Commenter's Reason: Simple and straight forward not ambiguous and very enforceable. When one asks someone to define the Buildings thermal envelope they realize that the envelope is not just insulation or merely the air barrier system. It is both, together, separating conditioned space from unconditioned space.

CE48-13, Part I
Final Action: AS AM AMPC____ D

CE48-13, Part II
C202, R202 (IRC N1101.9), IRC R202

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART II - IECC – RESIDENTIAL PROVISIONS

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

Revise definition as follows:

BUILDING THERMAL ENVELOPE. The <u>continuous alignment of the air barrier and thermal barrier in</u> basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

Reason: The thermal envelope is a crucial elements of the buildings structure in creation of efficient homes. If it not clearly defined then identification of the thermal boundary and implementation and enforcement of the energy code will continue to be ambiguous. The language here is intended to clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

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

R202-BUILDING THERMAL ENVELOPE-EC-SCHWARZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee; Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Building Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The proposed revision to text is poorly worded. The proponent had good intentions, but the text does not clearly accomplish the intent.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. ~~The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.~~ Building assemblies that provide a continuous air barrier and thermal barrier separating conditioned space from unconditioned space.

Commenter's Reason: Simple and straight forward not ambiguous and very enforceable. When one asks someone to define the Buildings thermal envelope they realize that the envelope is not just insulation or merely the air barrier system. It is both, together, separating conditioned space from unconditioned space.

CE48-13, Part II

Final Action: AS AM AMPC____ D

CE48-13, Part III
C202, R202 (IRC N1101.9), IRC R202

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART III – IRC

Revise definition as follows:

SECTION 202
GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The <u>continuous alignment of the air barrier and thermal barrier in</u> basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

Reason: The thermal envelope is a crucial elements of the buildings structure in creation of efficient homes. If it not clearly defined then identification of the thermal boundary and implementation and enforcement of the energy code will continue to be ambiguous. The language here is intended to clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

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

R202-BUILDING THERMAL ENVELOPE-EC-SCHWARZ.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee; Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Building Code Development Committee.

PART III – IRC
Committee Action: **Disapproved**

Committee Reason: The term 'alignment' is ambiguous and unenforceable. Also, the term 'thermal barrier' is confusing with the term already in use in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 202
GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. . ~~The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.~~ Building assemblies that provide a continuous air barrier and thermal barrier separating conditioned space from unconditioned space.

Commenter's Reason: Simple and straight forward not ambiguous and very enforceable. When one asks someone to define the Buildings thermal envelope they realize that the envelope is not just insulation or merely the air barrier system. It is both, together, separating conditioned space from unconditioned space.

CE48-13, Part III

Final Action: AS AM AMPC____ D

CE49-13, Part I
C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART I – IECC-COMMERCIAL PROVISIONS

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.</u>

C202-CIRCULATING HOT WATER SYSTEM (NEW)-EC-TOWLSEY.doc

Committee Action Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a good definition for terms used in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to ~~fixtures~~ <u>the fixture supply</u> and back to the water-heating equipment.

Commenter's Reason: The initial proposal was not intended to mean to recirculate to the actual fixture, but to supply the pipe serving the fixture. This modification clarifies the intent and identifies the correct connecting point ("fixture supply") between the circulation line and the actual fixture which is already defined in the IPC.

CE49-13, Part I

Final Action: AS AM AMPC____ D

CE49-13, Part II
C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART II – IPC

Add new definition as follows:

SECTION 202
GENERAL DEFINITIONS

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

C202-CIRCULATING HOT WATER SYSTEM (NEW)-EC-TOWLSEY.doc

Committee Action Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a good definition for terms used in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to ~~fixtures~~ the *fixture supply* and back to the water-heating equipment.

Commenter's Reason: The initial proposal was not intended to mean to recirculate to the actual fixture, but to supply the pipe serving the fixture. This modification clarifies the intent and identifies the correct connecting point ("fixture supply") between the circulation line and the actual fixture which is already defined in the IPC.

CE49-13, Part II
Final Action: AS AM AMPC____ D

CE49-13, Part III
C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART III – IECC-RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

Reason: A definition of a "circulating hot water system" does not exist in the code, yet it is referenced in the IRC and other ICC codes. This definition brings clarity to how a "circulating hot water system" should be designed and operated. In the codes and sections where "circulating hot water system" is used, this definition would also reduce the probability of confusion between hot water systems used for space heating or tempered water. Currently, the only place that the term CIRCULATING HOT WATER SYSTEM shows up in the code is IECC Section C404.6, IPC [E] 607.2.1 and IECC Section R403.4.1 (IRC N1103.4.1). Other proposals by other proponents will most likely be adding language that uses this term so it is important to have the term defined.

As referenced in CHAPTER 50 - SERVICE WATER HEATING of *ASHRAE Handbook-HVAC Applications* (2011, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.), "Some recirculation-loop systems...are equipped with circulating pumps to force water through the piping and back to the water heater, thus keeping water in the piping hot." Adding this definition in the code will be consistent with industry's understanding.

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

C202-CIRCULATING HOT WATER SYSTEM (NEW)-EC-TOWLSEY.doc

Committee Action Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART III – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This is an important definition to have in the code because these types of systems are used in buildings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Towsley, Grundfos representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to ~~fixtures~~ the *fixture supply* and back to the water-heating equipment.

Commenter's Reason: The initial proposal was not intended to mean to recirculate to the actual fixture, but to supply the pipe serving the fixture. This modification clarifies the intent and identifies the correct connecting point ("fixture supply") between the circulation line and the actual fixture which is already defined in the IRC.

CE49-13, Part III

Final Action: AS AM AMPC____ D

CE51-13, Part I
C202

Proposed Change as Submitted

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net), Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

Delete and substitute as follows:

SECTION C202
GENERAL DEFINITIONS

~~**CONDITIONED SPACE.** An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.~~

<u>**CONDITIONED SPACE**. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling.</u>

Reason: (Mozingo) Currently the definition for conditioned space differs in each code. The proposed change to the definition would bring the IECC and IRC in line with what was approved in Group A for the 2015 IMC as proposal M2-12. This proposal shows the modifications that were made by the committee and then went on to the consent agenda as there were no public comments received. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.
(Ursenbach) (**Part I)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved in the Group A hearings for the IMC under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010. **(Part II)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved for the IMC in the Group A hearings under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

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

C202-CONDITIONED SPACE-EC-MOZINGO-URSENBACH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal doesn't clarify, but was felt to add confusion to the definition. There was concern that the text would have unintended consequences. The committee preferred the current, concise text.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Hope Medina, Cherry Hills Village, CO, representing self, requests Approval as Submitted

Commenter's Reason: This proposal has been submitted to clarify the definition of conditioned space, specifically defining *indirect conditioning.* Consider a storage room or closet, located completely within the interior of an office. These spaces are surrounded by conditioned space, resulting in indirect conditioning through the un-insulated walls surround the room. Based on the previous definition in the IMC, code official often required direct conditioning of these spaces with supply air outlets, return air inlets or other conditioning methods. The alternative has been, insulate the storage room, placing it outside the thermal envelope, considering it unconditioned. The added expense is un-necessary, as these spaces are easily and sufficiently *indirectly conditioned.*

This proposal provides consistency with the definition in other I Codes. This proposal was submitted and approved by final action for the 2015 IMC, likewise approved by the committee for 2015 IRC - R202 and approved by assembly action for the 2015 IECC- R202. The opposition at the commercial hearings was based on a definition read by an opponent from ASHRAE 90.1 for *conditioned space*, when the appropriate similar definition in ASHRAE 90.1 is the definition for *indirectly conditioned space.* ASHRAE 90.1 defines.

indirectly conditioned space: an enclosed space within a building that is not a heated space or a cooled space, which is heated or cooled indirectly by being connected to adjacent space(s) provided:

a. the product of the U-factor(s) and surface area(s) of the space adjacent to connected space(s) exceeds the combined sum of the product of the U-factor(s) and surface area(s) of the space adjoining the outdoors, unconditioned spaces, and to or from semiheated spaces (e.g., corridors) or
b. that air from heated or cooled spaces is intentionally transferred (naturally or mechanically) into the space at a rate exceeding 3 ach.

In essence, 'a.' in ASHRAE 90.1 is stating; *if there is little or no insulation in the components/surfaces surrounding this spaces, compared to that in the thermal envelope, indirect conditioning will occur.*

Public Comment 2:

Donald Vigneau AIA, representing Northeast Energy Efficiency Partnerships Inc., requests Approval as Modified by this Public Comment.

Modify proposal as follows:

CONDITIONED SPACE. An area, room or space ~~that is~~ enclosed within the building thermal envelope ~~and~~ that is directly <u>or indirectly</u> heated or cooled ~~or that is indirectly heated or cooled~~. ~~Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling~~<u>.</u>

Commenter's Reason: Definitions should be succinct but also encompassing, the essence of the original proposal that improves upon the current definition. The proponent's change included unnecessary language that belongs in the commentary that is proposed here to be deleted. Although disapproved by the committees, the original proposed change had support from a successful Floor Action after the Residential Part II Disapproval decision which occurred first.
Request is for Approved as Modified by this Public Comment (AMPC).

CE51-13, Part I
Final Action: AS AM AMPC____ D

CE51–13, Part II
C202, R202 (IRC N1101.9)

Proposed Change as Submitted

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net), Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC RESIDENTIAL PROVISIONS

Delete and substitute as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

~~**CONDITIONED SPACE.** For energy purposes, space within a building that is provided with heating and/or cooling *equipment* or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a *conditioned space*. For mechanical purposes, an area, room or space being heated or cooled by any *equipment* or *appliance*.~~

CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling.

Reason: (Mozingo) Currently the definition for conditioned space differs in each code. The proposed change to the definition would bring the IECC and IRC in line with what was approved in Group A for the 2015 IMC as proposal M2-12. This proposal shows the modifications that were made by the committee and then went on to the consent agenda as there were no public comments received. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.
(Ursenbach) (**Part I)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved in the Group A hearings for the IMC under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010. **(Part II)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved for the IMC in the Group A hearings under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

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

C202-CONDITIONED SPACE-EC-MOZINGO-URSENBACH.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: The present definition of conditioned space is appropriate for the IECC.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted and because a public comment was submitted.

Public Comment:

Donald Vigneau AIA, representing Northeast Energy Efficiency Partnerships Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CONDITIONED SPACE. An area, room or space ~~that is~~ enclosed within the building thermal envelope ~~and~~ that is directly or indirectly heated or cooled ~~or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling~~.

Commenter's Reason: Definition should be succinct but also encompassing, the essence of the original proposal that improves upon the current definition. The proponent's change included unnecessary language that belongs in the commentary that is proposed here to be deleted. Although disapproved by the committees, the original proposed change had support from a successful Floor Action after the Residential Part II Disapproval decision which occurred first.
Request is for Approved as Modified by this Public Comment (AMPC).

CE51-13, Part II
Final Action: AS AM AMPC____ D

CE54-13
202 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**LINER SYSTEM (Ls).** A continuous vapor barrier liner membrane is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the liner membrane between the purlins. For multilayer installations, the last *rated R-value of insulation* is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached.</u>

<u>**FILLED CAVITY (FC).** The first *rated R-value of insulation* represents faced or unfaced insulation installed between the purlins. The second *rated R-value of insulation* represents unfaced insulation installed above the first layer, perpendicular to the purlins and compressed when the metal roof panels are attached. A supporting structure retains the bottom of the first layer at the prescribed depth required for the full thickness of insulation.</u>

Reason: Liner systems and filled cavity metal building roof assemblies can be used for compliance with the Opaque assembles in table C402.2. This adds definitions for the terms, which are identical to the already existing definition in ANSI/ASHRAE/IES Standard 90.1-2010

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

C202-LINEAR SYSTEM (Ls) (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Because CE90-13 was not approved, both of these definitions are not needed in the code. In addition, the committee found the proposed text needed improvement to reflect actual practice.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment:

Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

LS = *Liner System*~~—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.~~

(Balance of the table and original proposal remain unchanged)

Commenter's Reason: Regardless of the action on CE90, the term "Liner System" is used in Table C402.2, and should be defined. It is currently defined in footnote a of table C402.2, but defined terms should be in the definition section, not buried in a footnote of a table. CE90-13 includes the term 'filled cavity'. . If CE90-13 is approved, the term filled cavity needs to be defined.

Analysis: The term 'liner system' is already used in the code. The term 'filled cavity' is not currently in the code, but would be added to the code if CE90-13 is approved. If CE54 is approved, but CE90-13 is not approved, the term 'filled cavity' would not be included in the next code.

CE54-13

Final Action: AS AM AMPC____ D

CE59-13, Part I
C202, R202 (IRC N1101.9)

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

SECTION C202
GENERAL DEFINITIONS

Revise definitions as follows:

~~FENESTRATION~~ **VERTICAL FENESTRATION.** ~~Skylights, roof windows, vertical~~ ~~w~~ Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of~~.~~ ~~Fenestration includes products with~~ glass ~~and~~ ~~nonglass~~ or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal.

~~SKYLIGHT~~ **SKYLIGHT**. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees (1.05 rad) from horizontal. ~~Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.~~

Reason: The code currently has no thermal provisions (U-factor or SHGC) for any fenestration material or product installed at an angle of greater than 0 up to and including 30 degrees from vertical. This proposal clarifies the application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.

There are a number of commercial and residential building designs in which sloped glazing is used, and as such is clearly not vertical but in addition does not meet the greater than 30 degrees from vertical (at least 60 degrees from horizontal) criterion to consider it a skylight. While it may be inferred that vertical fenestration is intended to include all fenestration other than skylights, technically the code does not apply to the fenestration in question. Vertical fenestration is used in Sections C402.3.1, C402.3.1.1, C402.3.3, C402.3.3.1, C402.3.3.2, R402.5 and Table C402.3. This loophole needs to be corrected and rather than change the term in the code from vertical fenestration to some other term, it is considered more appropriate to define what is intended when using the term "vertical fenestration" even though it is not truly vertical. Another change makes it clear that fenestration can be either glass **or** nonglass glazing materials and does not need to include both glass **and** nonglass glazing materials. The last sentence in the current definition of skylight can be deleted because the terms for the products are added to the previous sentence and it is not necessary to indicate the location of the skylights as they will always be in a roof or wall assembly. The focus of both definitions is simply the angle of the fenestration as installed.

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

Note: The IBC, IRC and the IgCC have two defined terms related to skylights. They are 'skylights and sloped glazing' and 'skylight unit' as follows

> **SKYLIGHT, UNIT.** A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through and opening in the roof assembly while preserving the weather-resistant barrier of the roof.
> **SKYLIGHTS AND SLOPED GLAZING.** Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls, are included in this definition.

C202-FENESTRATION-EC-WILLIAMS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial

Committee Action: **Approved as Submitted**

Committee Reason: The proposal fills in a gap in the definitions of fenestration.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION C202
GENERAL DEFINITIONS

FENESTRATION. Products classified as either vertical fenestration or skylights.

> **Vertical fenestration.** Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal.
>
> **Skylight.** Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal.

Commenter's Reason: In the process of creating needed definition of vertical fenestration, the definition of fenestration, while embodied in the definition of vertical fenestration and skylight in the code change, is technically lost. That is, there is nothing to specifically define fenestration or tie that term to the two types of fenestration (vertical and skylights). The Code needs such an introduction, because the code still uses the term 'fenestration' in addition to the terms vertical fenestration and skylight.

By definition, fenestration is essentially anything non-opaque of any material in any location and then a subset of fenestration is a skylight. Then when you get into the technical requirements of the code you find that criteria are provided specifically for vertical fenestration and then for skylights. This public comment takes care of that by retaining the approved definitions of vertical fenestration and skylight, keeps them under the term 'fenestration' but then fills in the missing piece – a leading introductory definition of fenestration since that term is also used in the code in Chapter 2 and Chapter 3.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Public Comment 2:

Jeff Inks, Window & Door Manufacturers Association requests Disapproval.

Commenter's Reason: While the revised definition is not problematic in and of itself (although we do not believe a loophole exists or that a revised definition is necessary), we do not support the inclusion of two different definitions in the IECC for fenestration that is not classified as a skylight. Given Part I was approved as submitted and Part II was disapproved, an inconsistency has been created that needs to be resolved. We are therefore submitting this public comment to ensure both parts are slated for individual consideration at the PCH.

Public Comment 3:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Disapproval.

Commenter's Reason: By approving CE59 Part I, the committee created a definition of Vertical Fenestration, but it eliminated the only definition of fenestration. Both definitions are needed, but the approval creates a gap in definitions. We understand that the proponent of CE59 will be submitting a public comment to restore the definition of Fenestration as well as adding a definition of vertical fenestration. The SEHPCAC supports the concept of having both definitions. If DOE or similar public comment is not successful, then the proposal must be disapproved to restore the definition of fenestration.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE59-13, Part I
Final Action: AS AM AMPC____ D

CE59-13, Part II
C202, R202 (IRC N1101.9)

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise definitions as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

~~FENESTRATION~~. VERTICAL FENESTRATION. ~~Skylights, roof windows, vertical~~ ~~w~~ Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of~~.~~ ~~Fenestration includes products with~~ glass ~~and~~ ~~nonglass~~ or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees (1.05 rad) from horizontal.

~~SKYLIGHT~~ SKYLIGHT. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal. ~~Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.~~

Reason: The code currently has no thermal provisions (U-factor or SHGC) for any fenestration material or product installed at an angle of greater than 0 up to and including 30 degrees from vertical. This proposal clarifies the application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.

There are a number of commercial and residential building designs in which sloped glazing is used, and as such is clearly not vertical but in addition does not meet the greater than 30 degrees from vertical (at least 60 degrees from horizontal) criterion to consider it a skylight. While it may be inferred that vertical fenestration is intended to include all fenestration other than skylights, technically the code does not apply to the fenestration in question. Vertical fenestration is used in Sections C402.3.1, C402.3.1.1, C402.3.3, C402.3.3.1, C402.3.3.2, R402.5 and Table C402.3. This loophole needs to be corrected and rather than change the term in the code from vertical fenestration to some other term, it is considered more appropriate to define what is intended when using the term "vertical fenestration" even though it is not truly vertical. Another change makes it clear that fenestration can be either glass **or** nonglass glazing materials and does not need to include both glass **and** nonglass glazing materials. The last sentence in the current definition of skylight can be deleted because the terms for the products are added to the previous sentence and it is not necessary to indicate the location of the skylights as they will always be in a roof or wall assembly. The focus of both definitions is simply the angle of the fenestration as installed.

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

Note: The IBC, IRC and the igCC have two defined terms related to skylights. They are 'skylights and sloped glazing' and 'skylight unit' as follows

> **SKYLIGHT, UNIT.** A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through and opening in the roof assembly while preserving the weather-resistant barrier of the roof.
> **SKYLIGHTS AND SLOPED GLAZING.** Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls, are included in this definition.

C202-FENESTRATION-EC-WILLIAMS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The IECC-Residential Provisions do not use the term "vertical fenestration." In addition, the proposal would remove the definition of "fenestration", which is a term used extensively in the Code.-

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R202 (N1101.9)
GENERAL DEFINITIONS

FENESTRATION. Products classified as either *vertical fenestration* or *skylights*.

VERTICAL FENESTRATION. Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal.

SKYLIGHT. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal.

Commenter's Reason: The published reason for disapproval from the Committee Action Hearings is that the "IECC-Residential Provisions do not use the term 'vertical fenestration'." This is incorrect, as section R402.5 of the 2012 IECC uses the words "vertical fenestration." The IECC does not define "vertical" and a definition is needed, as fenestration on surfaces such as A-frame houses may not be purely 90 degrees vertical but may be steeper than the 60 degree angle in the skylight definition and therefore not be classified as skylights.

The published reason for disapproval from the Committee Action Hearings also states, "the proposal would remove the definition of 'fenestration'," which is a term used extensively in the Code." This Public Comment resolves this by adding a simple definition of fenestration. The definitions of "vertical fenestration" and "skylight" proposed here are identical to definitions in CE59 Part 1, which was approved by the IECC-Commercial committee in Dallas in April.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Public Comment 2:

Jeff Inks, Window & Door Manufacturers Association, requests Disapproval.

Commenter's Reason: While the revised definition is not problematic in and of itself (although we do not believe a loophole exists or that a revised definition is necessary), we do not support the inclusion of two different definitions in the IECC for fenestration that is not classified as a skylight. Given Part I was approved as submitted and Part II was disapproved, an inconsistency has been created that needs to be resolved. We are therefore submitting this public comment to ensure both parts are slated for individual consideration at the PCH.

CE59-13, Part II

Final Action: AS AM AMPC____ D

CE60-13
C301, C301.1, Figure C301.1, Table C301.1, C301.2, C301.3

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Delete and substitute as follows:

~~SECTION C301~~
~~CLIMATE ZONES~~

~~**C301.1 General.** Climate zones from Figure C301.1 or Table C301.1 shall be used in determining the applicable requirements from Chapter 4. Locations not in Table C301.1 (outside the United States) shall be assigned a climate zone based on Section C301.3.~~

~~FIGURE C301.1~~
~~CLIMATE ZONES~~

~~TABLE C301.1~~
~~CLIMATE ZONES, MOISTURE REGIMES, AND WARM HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY~~

~~**C301.2 Warm humid counties.** Warm humid counties are identified in Table C301.1 by an asterisk.~~

~~**C301.3 International climate zones.** The climate zone for any location outside the United States shall be determined by applying Table C301.3(1) and then Table C301.3(2).~~

~~TABLE C301.3(1)~~
~~INTERNATIONAL CLIMATE ZONE DEFINITIONS~~

~~TABLE C301.3(2)~~
~~INTERNATIONAL CLIMATE ZONE DEFINITIONS~~

C301
CLIMATE ZONES

C301.1 Climates zones shall be as specified in Section R301.

Reason: If multiple climate zone maps are retained within the I-codes, these maps may diverge over time. It is best to have one climate zone map that all use for the I-codes.

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

C301 (NEW)-EC-CONNER.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The parallel code format requires that both Residential and Commercial Codes be complete. The two codes will diverge, but the maps shouldn't. The committees will just need to be diligent in keeping the maps consistent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self; Hope Medina City of Cherry Hills Village, CO representing self, requests Approval as Submitted.

Commenter's Reason: As part of separating the residential and commercial requirements two copies of the same map and table were created. It is important to keep the codes consistent. If the climate zone maps diverge, which is correct? For the non-code users that reference the IECC climate zone map for other purposes, which should they use? Can a jurisdiction really be in two climate zones? What happens with a mixed use residential/commercial building, is the building itself in two climate zones?

Some argued that it was a problem to have items on the commercial map that were not used in commercial energy code, or items on the residential map that are not used in residential energy code. However that is part of keeping the two maps the same. In fact we are already there. The climate zones 2A, 2B, 3A, 3B, 4A, 4B, 5A, and 5B are defined in residential, but not used. Similarly the "warm-humid" counties are defined in commercial but never used. Let's keep one climate zone map.

CE60-13

Final Action: AS AM AMPC____ D

CE64-13, Part I

C202 (NEW), C303.1.1, C303.1.1.1 (NEW), C303.1.1.2 (NEW), C303.1.1.3 (NEW), Chapter 5, R202 (NEW) (IRC N1101.9 (NEW)), R303.1.1 (IRC N1101.12.1), R303.1.1.1 (NEW) (IRC N1101.12.1.1 (NEW)), R303.1.1.2 (NEW) (IRC N1101.12.1.1.2 (NEW)), R303.1.1.3 (NEW) (IRC N1101.12.1.1.3 (NEW)), Chapter 5

Proposed Change as Submitted

Proponent: Vickie Lovell, InterCode Incorporated, representing Reflective Insulation manufacturers Association International (Vickie@intercodeinc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C303.1.1 Building thermal envelope insulation. An *R* value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the *building thermal envelope.* ~~For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and R-value of installed thickness shall be *listed* on the certification.~~ The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

<u>**C303.1.1.1 Blown or sprayed fiberglass and cellulose insulation.** For blown or sprayed fiberglass and cellulose insulation the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be *listed* on the certification.</u>

<u>**C303.1.1.2 Sprayed polyurethane foam insulation.** For sprayed polyurethane foam (SPF) insulation the installed thickness of the areas covered and R-value of installed thickness shall be *listed* on the certification.</u>

<u>**C303.1.1.3 Reflective insulation.** Reflective insulation shall be labeled with the number of reflective sheets and the number and thickness of the enclosed air spaces to attain the product R-value as determined in accordance with ASTM C1224.</u>

Add new definitions as follows:

<u>**ENCLOSED AIR SPACE**. An unventilated cavity between two continuous surfaces (sheets) with a continuous border of building components.</u>

<u>**REFLECTIVE INSULATION.** An assembly with one or more surfaces with emittance of 0.1 or less with at least one low emittance surface that faces an enclosed air space.</u>

Add new standard to Chapter 5 as follows:

ASTM

<u>C1224-11 Standard Specifications for Reflective Insulation for Building Applications</u>

Reason: The section at present incorporates requirements that are specific to blown or sprayed fiberglass and cellulose insulation and to sprayed polyurethane foam insulation together with general requirements for building thermal envelope insulation materials. This proposal separates the generic and specific requirements.

The proposal also adds specific requirements similar to those for the other insulation materials (as well as appropriate definitions) for a type of material that has been in the market place for over 20 years and has had nationwide distribution and installation, namely reflective insulation. These products are well established and have two associated ASTM Standards, namely ASTM C727, Standard Practice for Installation and Use of Reflective Insulation in Building Constructions, and ASTM C1224, Standard Specification for Reflective Insulation for Building Applications. ASTM C1224 should be included in the IECC to provide the appropriate product specifications for reflective insulations.

ASTM C1224 can be viewed at: http://reflectixinc.com/literature/securedpdfs/C1224.pdf.

The products are currently included in the following state codes:

- FL – 2007 Florida Building Code, Section 719.1; 719.2.1 & Table 13-C1.2.3 & ASTM References Subchapter 13-3 (C1224)
- FL – 2010 Florida Building Code, Table 303.2 (ASTM Standards)
- MN - Thermal Insulation Standards, Section 7641.0130, Subpart 7

The purpose of this proposal is to incorporate into the IECC language that clarifies the pertinent requirements regarding reflective insulation R-values that are based on ASTM standards and shall be listed on certifications.

A companion proposal is being provided for section C303.

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

Note: The two terms defined in this proposal are not found in other International Codes. However, the IBC does define 'reflective plastic core foil insulation' as follows:

> **REFLECTIVE PLASTIC CORE FOIL INSULATION.** An insulation material packaged in rolls, that is less than 0.5 inches thick, with at least one exterior low emittance surface (0.1 or less) and a core material containing voids or cells.

Analysis: A review of the standard proposed for inclusion in the code, C1224-2011 Standard Specifications for Reflective Insulation for Building Applications, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C303.1.1-EC-LOVELL.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

For staff analysis of the content of ASTM C1224-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf"

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee was concerned that this product was going to be approved by a unique testing standard distinct from other products. The proposal lacked a requirement that installation be per manufacturer's installation instructions.

Outside of the intent of this proposal to add an additional category of insulation to the two currently listed, the committee expressed concern that the code shouldn't be a listing service and that perhaps none of the specific products be included in the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Vickie Lovell, INTERCODE, INC, representing Reflective Insulation Manufacturer's Association – International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C303.1.1.3 Reflective insulation. Reflective insulation shall be labeled with the number of reflective sheets and the number and thickness of the enclosed <u>reflective</u> air spaces to attain the product R-value as determined in accordance with ASTM C1224. <u>Product shall be installed in accordance with the manufacturer's installation instructions.</u>

Revise definitions as follows:

ENCLOSED <u>REFLECTIVE</u> AIR SPACE. An ~~unventilated~~ <u>unvented</u> cavity ~~between two continuous surfaces (sheets) with a continuous border of building components.~~ <u>bounded by building components on all sides with at least one side being a continuous air-barrier and at least one surface having an emittance of 0.10 or less.</u>

REFLECTIVE INSULATION. An assembly with one or more surfaces with emittance of 0.1<u>0</u> or less with at least one low emittance surface that faces an enclosed <u>reflective</u> air space.

(Portions of proposal not show remain unchanged)

Commenter's Reason: The committee comments were helpful in improving the language and those revisions have been incorporated into this Public Comment. This was great feedback, but there were some misconceptions that need clarified. These products are tested to the FTC approved hot box testing method of ASTM C1363. The word emittance is included in the ASHRAE fundamentals handbook and pertains to cool roofs, windows and reflective insulation. As far as a product category, these products have been in the market for 20+ years, have three ASTM Standards and are recognized by the FTC, ICC and ASHRAE.

The committee had two suggestions on text revisions:

- Clarify the definition for an enclosed air space as it pertains to this product type
- Include a reference to "manufacturer's installation instructions"

This language is a useful enforcement tool. It identifies key features for a product that is widely utilized and has been in the market for over 20 years.

The products are currently included in the following state codes:

• FL – 2007 Florida Building Code, Section 719.1; 719.2.1 & Table 13-C1.2.3 & ASTM References Subchapter 13-3 (C1224)
• FL – 2010 Florida Building Code, Table 303.2 (ASTM Standards)
• MN - Thermal Insulation Standards, Section 7641.0130, Subpart 7

The purpose of this proposal is to incorporate into the IECC language that clarifies the pertinent requirements regarding reflective insulation R-values that are based on ASTM standards and shall be listed on certifications.

Public Comment 2:

Jay H. Crandell, ARES Consulting, representing Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

ENCLOSED AIR SPACE. An unventilated cavity <u>located to the interior side of a continuous air-barrier and bounded on all sides with</u> ~~between two continuous surfaces (sheets) with a continuous border of~~ building components <u>assembled together in a manner that prevents indoor or exterior air leakage into or from the cavity or between adjacent cavities, including sealing of penetrations.</u>

(Portions of proposal not show remain unchanged)

Commenter's Reason: This public comment addresses the need to ensure that an enclosed air space is described and detailed in such a manner to prevent air leakage, not just to avoid intentionally ventilating the air space. This addresses one of the concerns which prompted the committee's reason for disapproval.

As written in the original proposal, the definition does not prevent the location and detailing (or lack of detailing) of airspaces such that R-values comparable to the method by which they are tested per ASTM C1224 can be nominally achieved in practice. Concerns documented in the literature with regard to dust exposure and accumulation which impact the long-term (or short term) performance of reflective air spaces are not addressed in this public comment, particularly with regard to horizontal enclosed airspace applications. This public comment and the original proposal still do not address other concerns such as the significant difference in thermal performance with regard to seasonal changes in heat flow direction for horizontal airspaces. While these other concerns should be addressed, the main concern of this public comment is with the significant impact of air leakage on the thermal performance of airspaces. The modified definition provides an adequate and enforceable description of the characteristics of an airspace that is suitable for consideration of thermal properties, whether the enclosed airspace includes a reflective insulation or not. A review of the scientific literature on this topic was conducted to guide this public comment and will be made available at fsc.americanchemistry.com.

CE64-13, Part I
Final Action: AS AM AMPC____ D

CE64-13, Part II

C202 (NEW), C303.1.1, C303.1.1.1 (NEW), C303.1.1.2 (NEW), C303.1.1.3 (NEW), Chapter 5, R202 (NEW) (IRC N1101.9 (NEW)), R303.1.1 (IRC N1101.12.1), R303.1.1.1 (NEW) (IRC N1101.12.1.1 (NEW)), R303.1.1.2 (NEW) (IRC N1101.12.1.1.2 (NEW)), R303.1.1.3 (NEW) (IRC N1101.12.1.1.3 (NEW)), Chapter 5

Proposed Change as Submitted

Proponent: Vickie Lovell, InterCode Incorporated, representing Reflective Insulation manufacturers Association International (Vickie@intercodeinc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R303.1.1 (N1101.12.1) Building thermal envelope insulation. An *R* value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the *building thermal envelope.* ~~For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and R-value of installed thickness shall be *listed* on the certification.~~ The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

R303.1.1.1 (N1101.12.1.1) Blown or sprayed fiberglass and cellulose insulation. For blown or sprayed fiberglass and cellulose insulation the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be *listed* on the certification.

R303.1.1.2 (N1101.12.1.2) Sprayed polyurethane foam insulation. For sprayed polyurethane foam (SPF) insulation the installed thickness of the areas covered and R-value of installed thickness shall be *listed* on the certification.

R303.1.1.3 (N1101.12.1.3) Reflective insulation. Reflective insulation shall be labeled with the number of reflective sheets and the number and thickness of the enclosed air spaces to attain the product R-value as determined in accordance with ASTM C1224.

Add new definitions as follows:

ENCLOSED AIR SPACE. An unventilated cavity between two continuous surfaces (sheets) with a continuous border of building components.

REFLECTIVE INSULATION. An assembly with one or more surfaces with emittance of 0.1 or less with at least one low emittance surface that faces an enclosed air space.

Add new standard to Chapter 5 as follows:

ASTM

C1224-11 Standard Specifications for Reflective Insulation for Building Applications

Reason: The section at present incorporates requirements that are specific to blown or sprayed fiberglass and cellulose insulation and to sprayed polyurethane foam insulation together with general requirements for building thermal envelope insulation materials. This proposal separates the generic and specific requirements.

The proposal also adds specific requirements similar to those for the other insulation materials (as well as appropriate definitions) for a type of material that has been in the market place for over 20 years and has had nationwide distribution and installation, namely reflective insulation. These products are well established and have two associated ASTM Standards, namely ASTM C727, Standard Practice for Installation and Use of Reflective Insulation in Building Constructions, and ASTM C1224, Standard Specification for Reflective Insulation for Building Applications. ASTM C1224 should be included in the IECC to provide the appropriate product specifications for reflective insulations.

ASTM C1224 can be viewed at: http://reflectixinc.com/literature/securedpdfs/C1224.pdf.

The products are currently included in the following state codes:

- FL – 2007 Florida Building Code, Section 719.1; 719.2.1 & Table 13-C1.2.3 & ASTM References Subchapter 13-3 (C1224)
- FL – 2010 Florida Building Code, Table 303.2 (ASTM Standards)
- MN - Thermal Insulation Standards, Section 7641.0130, Subpart 7

The purpose of this proposal is to incorporate into the IECC language that clarifies the pertinent requirements regarding reflective insulation R-values that are based on ASTM standards and shall be listed on certifications.

A companion proposal is being provided for section C303.

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

Note: The two terms defined in this proposal are not found in other International Codes. However, the IBC does define 'reflective plastic core foil insulation' as follows:

> **REFLECTIVE PLASTIC CORE FOIL INSULATION.** An insulation material packaged in rolls, that is less than 0.5 inches thick, with at least one exterior low emittance surface (0.1 or less) and a core material containing voids or cells.

Analysis: A review of the standard proposed for inclusion in the code, C1224-2011 Standard Specifications for Reflective Insulation for Building Applications, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C303.1.1-EC-LOVELL.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

For staff analysis of the content of ASTM C1224-11 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf"

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: There is unclear language in definition of reflective insulation— what is emittance? There is apparently some doubt regarding the efficacy of this product.

Assembly Action: None

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Vickie Lovell, Intercode, Inc, representing Reflective Insulation Manufacturers Association – International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R303.1.1.3 (N1101.12.1.3) Reflective insulation. Reflective insulation shall be labeled with the number of reflective sheets and the number and thickness of the enclosed <u>reflective</u> air spaces to attain the product R-value as determined in accordance with ASTM C1224. <u>Product shall be installed in accordance with the manufacturer's installation instructions.</u>

Revise definitions as follows:

ENCLOSED <u>REFLECTIVE</u> AIR SPACE. An ~~unventilated~~ <u>unvented</u> cavity ~~between two continuous surfaces (sheets) with a continuous border of building components.~~ <u>bounded by building components on all sides with at least one side being a continuous air-barrier and at least one surface having an emittance of 0.10 or less.</u>

REFLECTIVE INSULATION. An assembly with one or more surfaces with emittance of 0.1<u>0</u> or less with at least one low emittance surface that faces an enclosed <u>reflective</u> air space.

(Portions of proposal not show remain unchanged)

Commenter's Reason: The committee comments were helpful in improving the language and those revisions have been incorporated into this Public Comment. This was great feedback, but there were some misconceptions that need clarified. These products are tested to the FTC approved hot box testing method of ASTM C1363. The word emittance is included in the ASHRAE fundamentals handbook and pertains to cool roofs, windows and reflective insulation. As far as a product category, these products have been in the market for 20+ years, have three ASTM Standards and are recognized by the FTC, ICC and ASHRAE.

The committee had two suggestions on text revisions:

- Clarify the definition for an enclosed air space as it pertains to this product type
- Include a reference to "manufacturer's installation instructions"

This language is a useful enforcement tool. It identifies key features for a product that is widely utilized and has been in the market for over 20 years.

The products are currently included in the following state codes:

• FL – 2007 Florida Building Code, Section 719.1; 719.2.1 & Table 13-C1.2.3 & ASTM References Subchapter 13-3 (C1224)
• FL – 2010 Florida Building Code, Table 303.2 (ASTM Standards)
• MN - Thermal Insulation Standards, Section 7641.0130, Subpart 7

The purpose of this proposal is to incorporate into the IECC language that clarifies the pertinent requirements regarding reflective insulation R-values that are based on ASTM standards and shall be listed on certifications.

Public Comment 2:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

ENCLOSED AIR SPACE. An unventilated cavity <u>located to the interior side of a continuous air-barrier and bounded on all sides with</u> ~~between two continuous surfaces (sheets) with a continuous border of~~ building components <u>assembled together in a manner that prevents indoor or exterior air leakage into or from the cavity or between adjacent cavities, including sealing of penetrations.</u>

(Portions of proposal not show remain unchanged)

Commenter's Reason: This public comment addresses the need to ensure that an enclosed air space is described and detailed in such a manner to prevent air leakage, not just to avoid intentionally ventilating the air space. This addresses one of the concerns which prompted the committee's reason for disapproval.

As written in the original proposal, the definition does not prevent the location and detailing (or lack of detailing) of airspaces such that R-values comparable to the method by which they are tested per ASTM C1224 can be nominally achieved in practice. Concerns documented in the literature with regard to dust exposure and accumulation which impact the long-term (or short term) performance of reflective air spaces are not addressed in this public comment, particularly with regard to horizontal enclosed airspace applications. This public comment and the original proposal still do not address other concerns such as the significant difference in thermal performance with regard to seasonal changes in heat flow direction for horizontal airspaces. While these other concerns should be addressed, the main concern of this public comment is with the significant impact of air leakage on the thermal performance of airspaces. The modified definition provides an adequate and enforceable description of the characteristics of an airspace that is suitable for consideration of thermal properties, whether the enclosed airspace includes a reflective insulation or not. A review of the scientific literature on this topic was conducted to guide this public comment and will be made available at fsc.americanchemistry.com.

CE64-13, Part II
Final Action: AS AM AMPC____

CE66-13, Part I
C301.4 (NEW), R301.4 (NEW) (IRC N1101.10.3 (NEW)), R406 (NEW) (IRC N1106 (NEW))

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Agustin Mujica, Levitt Homes, Puerto Rico

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C301.4 Tropical climate zone. The tropical climate zone shall be defined as:

1. Hawaii, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and
2. Islands in the area between the Tropic of Cancer and the Tropic of Capricorn

Reason: This creates a Chapter 4 alternative for residences in the tropical climates as a new section. Tropical areas are quite different from the US mainland in climate, construction techniques, traditional construction, and energy prices. The IECC treats tropical climates as if they were simply a southern extension of the US mainland. Traditional residences, especially the less expensive residences, have evolved inexpensive ways to work with the tropical climates to provide comfortable interior spaces without the need for substantial space conditioning. Tropical electrical prices, usually over 20 cents per hWh, provide a substantial incentive for energy conservation. Solar water heating works particularly well in tropical climates.

This proposed change is meant to add a simple option for a newly defined climate zone, the “tropical zone”. The area between the Tropic of Cancer and the Tropic of Capricorn is the area between 23.5° northern and southern latitude of the equator. A zone that recognizes the unusually constant and unique climate of this region would help make the ICC Codes more of an “international code”.

Traditional construction, especially with solar water heating, is usually more energy efficient than the construction style assumed in the IECC, as is shown by an analysis done for Puerto Rico.[1] Using energy efficient versions of traditional construction saves more energy and is much more cost-effective than pushing those in tropical climates to adopt mainland construction practices. Traditional tropical construction focuses on greatly reducing or eliminating the need for space conditioning by making a living space that is comfortable without space conditioning.

The requirements proposed here are based on informal conversations with those who live in tropical regions. The proponent does not live in the proposed tropical zone and will continue to solicit the input of those who do. Some items were taken from energy codes proposed or in place in the tropical regions. This is not intended as a replacement for existing topical codes, such as the energy codes recently adopted in Hawaii and Puerto Rico. This is meant as a simple climate-appropriate alternative for tropical climates.

Reason by item:
#1 Air conditioning only a portion of the residence is common in some residences and saves energy compared to air conditioning the whole occupied space.
#2 Heating is seldom needed.
#3 Consistently warm temperatures and high power costs make solar water heating very attractive. Solar water heating is widely used. Water heating is often 35% or more of the residential energy use.[1,2] Substantial energy savings come from solar water heating.
#4 Limiting solar gains and providing ventilation is the energy focus for windows. Window U-factor has little impact. Window air tightness is of little value when the important feature of the windows is their ability to be operable and provide ventilation.
#5 High efficiency lighting makes sense with tropical energy prices.
#6 This references the “cool roof” provisions. This is similar to an option in Hawaii’s code and the Puerto Rico Energy Center’s analysis. Insulation is less valuable in mild climates where the outside temperature is often comfortable as an inside temperature.
#7 Even flat roofs need to drain.
#8 Ventilation provided by tropical winds makes occupied spaces more comfortable. 14% is an option for unconditioned residences in Hawaii’s new energy code.
#9 When bedroom walls facing two directions are available, ventilation on both walls will be more effective.
#10 Interior doors should not block bedroom ventilation. This is similar to Hawaii’s new energy code and recommended by the Puerto Rico Energy Center.

#11 Ceiling fans increase comfort without conditioning the air. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.

1. "Energy Modeling of Low Income Residencies" by C. G. Morales & A. J. Malavé
   http://library.witpress.com/pages/PaperInfo.asp?PaperID=22547
   The paper above is not free. The proponents will send a Puerto Rico Energy Center presentation done for DOE that summarizes that work to anyone who requests this by email.
2. Typical Hawaiin energy use for hot water: http://www.hawaiienergy.com/16/water-heating

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

C301.4 (NEW)-CONNER-MUJICA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: Without any specific provisions which would apply uniquely to a tropical climate zone, there is no need for it to be created. Applying such a tropical zone to all of the island of Hawai'i is in appropriate as the range of elevations on the island result in a range of climate zones.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self; Howard C. Wiig, Energy Analyst, Department of Business, Economic Development, and Tourism, representing State of Hawaii, request Approval as Submitted.

Commenter's Reason: The climate in tropical islands is uniquely constant, with moderate temperatures year around. Parts I and II of CE66 create a tropical climate zone, which is a subset of IECC climate zone 1. Part II also creates a residential "deemed to comply" option for the tropical island climate based on their traditional residential construction.

Part II of this change was approved by the residential IECC committee with the reason that the "*options are appropriate to a unique climate zone*". Part II included the option for traditional construction that lowers energy use by taking advantage of the moderate tropical climate. The modifications to Part II in this public comment do not apply to Part I, so Part I is simply "as submitted".

These changes were made based on comments received, both at the hearing and afterwards.

1. The first modification deals with high elevations in Hawaii, where a 2400 feet above sea level limit was added. Commenters noted the difference between inland Hawaiian climates at higher elevations and the coastal Hawaiian climates. (By far the highest tropical island elevations occur in Hawaii.) Commenters noted that the traditional construction that might work well in coastal Hawaii and other islands, but would not work well at the higher Hawaiian elevations. Therefore, the "deemed to comply" option is limited to elevations below 2400 feet above sea level; because that elevation is already used in the Hawaiian energy code. In reality this has limited effect because less than 2% of the Hawaiian population lives above that level.

Two other comments resulted in changes.

2. The term "roof" was changed to "roof/ceiling" to cover both possible locations for insulation (item #6).
3. The "bedroom walls" became "exterior bedroom walls" which was implied, but not stated (item #9). Exterior walls are the best source of the tropical breezes that help keep the residences comfortable and lessen the need for energy. Other comments did not result in changes.

Overall, the largest criticism of the tropical climate zone was that it was arbitrary, unjustified and not related to the existing IECC climate zones. The existing climate zones were developed at the Pacific Northwest National Laboratory (PNNL, a US

Department of Energy lab) as part of the rewrite and simplification of the IECC that become the 2006 IECC. The development of the climate zones is documented in two publications[1,2].

PNNL staff went through an extended analysis to try to group climates for the IECC. Grouping climates turned out to be difficult. After an extensive analysis PNNL stated " … boundaries were found in the Köppen classification that served as good approximations for the divisions that emerged from the … analysis .."[3] The Köppen Climate Classification is the mostly widely used system for classifying the world's climates[4]. In particular PNNL took the primary criteria for IECC zone 1 from Köppen (Koppen's tropical climate)[5].

PNNL adapted the Köppen system for use as a building energy code (IECC). Adaptations included using the political boundaries of jurisdictions (counties, occasionally states) and classifying large counties based on the locations in the county where building occurs rather than the extreme climates where few people live.

As in the existing IECC climate zones, the proposed tropical climate zone is based on Köppen's classification of climates. Köppen divided the earth's climates into five major types of climates, one of the climate types being "tropical". According to Köppen, tropical climates are characterized by constant high temperature (at sea level and low elevations) — all twelve months of the year in the proposed zone in question have average temperatures of 18 °C (64.4 °F) or higher[6]. The existing IECC zone 1 boundary and the proposed tropical climate zone are based on the Köppen temperature criteria for Köppen's "tropical zone".

Traditional tropical construction works best where temperatures are relatively constant and relatively warm. Köppen's tropical climates define a region with a large solar radiation that is relatively constant from month to month, ensuring both high temperatures and almost an absence of seasons. Typically, the temperature difference between day and night is greater than that between the warmest and the coolest month, the opposite of other climate zones[7].

There were a few other comments that are being addressed here.

Some argued that the proposed "deemed to comply" option might not be as energy efficient as the current zone 1 code. An energy analysis for Puerto Rico was reference #1 in the original proposal. Many parts of the "deemed to comply" option are taken from or adapted from the current Hawaiian energy code and/or the Puerto Rican energy code. Specifying that half the occupied space is neither cooled nor heated is a significant reduction in energy use. Specifying 80% of the water heating is solar water heating (renewable energy) saves considerable energy in a region where water heating is a big end use for energy (see reference #2 in the original comment).

Some argued that the tropical zone SHGC should be the same as the Zone 1 SHGC in the IECC, which is an SHGC of 0.25. SHGCs of 0.25 usually mean double pane windows. Due to the warm and constant outdoor temperature, these windows are not remotely cost-effective in the tropical zone. The current Puerto Rico Energy Code has a requirement for 0.40 SHGC. The Tropical Energy Code, in use in Guam and elsewhere, has no requirement for residential SHGC. A jalousie window or louvered windows, common in the tropics and often constructed locally, often have no low SHGC coating, so this is an increased requirement for most of them.

Some argued that the climate zone map in the commercial IECC should not include features that are not used in the commercial energy code. However, for both residential and commercial use the same IECC climate map is used and it is important to keep that consistency. Because both chapters use copies of the same map, they both already include features not used in their respective portions of the IECC. The climate zones 2A, 2B, 3A, 3B, 4A, 4B, 5A, and 5B are not used in residential. Similarly the "warm-humid" counties are not used in commercial. Let's keep one climate zone map.

Some commented that the term "occupied space" was unclear. The term occupied space is defined by the IRC. The term is used because some of the "occupied space" is not "conditioned space".

A "deemed to comply" option for the tropical island climate based on their traditional residential construction would provide an economical option for improving energy efficiency in the tropical island climate.

References:

1. Climate classification for building energy codes and standards: Part 1—Development Process. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
2 . Climate classification for building energy codes and standards: Part 2—Zone definitions, maps, and comparisons. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
3. From reference 1 above, page 116.
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5. From reference 1 above, page 119."*The 5000 CDD10° C (9000 CDD50° F) dividing line for the lower limit of the hottest zone (also a 90.1 bin boundary) was selected because it corresponds in the United States with the dividing line between tropical and subtropical climates in the Köppen-Geiger system.*"
6. The is a short description of tropical climates in http://en.wikipedia.org/wiki/Tropical_climates
7. Weather Channel data demonstrates the constant temperatures in the tropical islands.

Google " weather channel average monthly temperature city_name state_name".
For example "weather channel average monthly temperature San Juan Puerto Rico"
Click first Google hit. Click boxes for "extreme high" and "extreme low". Compare tropical and non-tropical cities if you like.

CE66-13, Part I

Final Action: AS AM AMPC____ D

CE66-13, Part II
C301.4 (NEW), R301.4 (NEW) (IRC N1101.10.3 (NEW)), R406 (NEW) (IRC N1106 (NEW))

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Agustin Mujica, Levitt Homes, Puerto Rico

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R301.4 (N1101.10.3) Tropical climate zone. The tropical climate zone shall be defined as:

1. Hawaii, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and
2. Islands in the area between the Tropic of Cancer and the Tropic of Capricorn.

R406. (N1106) Tropic zone option. *Residential buildings* in the tropical zone shall be deemed to comply with this Chapter where the following conditions are met:

1. Not more than one half of the *occupied space* is air conditioned.
2. The *occupied space* is not heated.
3. Solar, wind, or other renewable energy source supplies at least 80 percent of the energy for service water heating.
4. Glazing in *conditioned space* has a *solar heat gain coefficient* of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.
5. Permanently installed lighting is in accordance with Section R404.
6. The exterior roof surface complies with one of the options in Table C402.2.1.1, or the roof has insulation with an *R-value* of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.
7. Roof surfaces have a minimum slope of one quarter inch per foot of run. The finished roof does not have water accumulation areas.
8. Operable fenestration provides ventilation area equal to a minimum of 14% of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.
9. Bedrooms with walls facing two different directions have operable fenestration facing two directions.
10. Interior doors to bedrooms are capable of being secured in the open position.
11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest non-bedroom space.

Reason: This creates a Chapter 4 alternative for residences in the tropical climates as a new section. Tropical areas are quite different from the US mainland in climate, construction techniques, traditional construction, and energy prices. The IECC treats tropical climates as if they were simply a southern extension of the US mainland. Traditional residences, especially the less expensive residences, have evolved inexpensive ways to work with the tropical climates to provide comfortable interior spaces without the need for substantial space conditioning. Tropical electrical prices, usually over 20 cents per hWh, provide a substantial incentive for energy conservation. Solar water heating works particularly well in tropical climates.

This proposed change is meant to add a simple option for a newly defined climate zone, the “tropical zone”. The area between the Tropic of Cancer and the Tropic of Capricorn is the area between 23.5° northern and southern latitude of the equator. A zone that recognizes the unusually constant and unique climate of this region would help make the ICC Codes more of an “international code”.

Traditional construction, especially with solar water heating, is usually more energy efficient than the construction style assumed in the IECC, as is shown by an analysis done for Puerto Rico.[1] Using energy efficient versions of traditional construction saves more energy and is much more cost-effective than pushing those in tropical climates to adopt mainland construction practices. Traditional tropical construction focuses on greatly reducing or eliminating the need for space conditioning by making a living space that is comfortable without space conditioning.

The requirements proposed here are based on informal conversations with those who live in tropical regions. The proponent does not live in the proposed tropical zone and will continue to solicit the input of those who do. Some items were taken from energy codes proposed or in place in the tropical regions. This is not intended as a replacement for existing topical codes, such as the energy codes recently adopted in Hawaii and Puerto Rico. This is meant as a simple climate-appropriate alternative for tropical climates.

Reason by item:
#1 Air conditioning only a portion of the residence is common in some residences and saves energy compared to air conditioning the whole occupied space.
#2 Heating is seldom needed.
#3 Consistently warm temperatures and high power costs make solar water heating very attractive. Solar water heating is widely used. Water heating is often 35% or more of the residential energy use.[1,2] Substantial energy savings come from solar water heating.
#4 Limiting solar gains and providing ventilation is the energy focus for windows. Window U-factor has little impact. Window air tightness is of little value when the important feature of the windows is their ability to be operable and provide ventilation.
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1. “Energy Modeling of Low Income Residencies“ by C. G. Morales & A. J. Malavé
http://library.witpress.com/pages/PaperInfo.asp?PaperID=22547
The paper above is not free. The proponents will send a Puerto Rico Energy Center presentation done for DOE that summarizes that work to anyone who requests this by email.
2. Typical Hawaiin energy use for hot water: http://www.hawaiienergy.com/16/water-heating

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

C301.4 (NEW)-CONNER-MUJICA.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential

Committee Action: **Approved as Submitted**

Committee Reason: This installs energy saving options appropriate for a unique climate zone.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Craig Conner, Building Quality, representing self; Howard C. Wiig, Energy Analyst, Department of Business, Economic Development, and Tourism, representing State of Hawaii, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R406. (N1106) Tropic zone option. *Residential buildings* in the tropical zone <u>at elevations below 2400 feet above sea level</u> shall be deemed to comply with this Chapter where the following conditions are met:

1. Not more than one half of the *occupied space* is air conditioned.
2. The *occupied space* is not heated.
3. Solar, wind, or other renewable energy source supplies at least 80 percent of the energy for service water heating.
4. Glazing in *conditioned space* has a *solar heat gain coefficient* of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.
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6. The exterior roof surface complies with one of the options in Table C402.2.1.1, or the roof<u>/ceiling</u> has insulation with an *R-value* of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.
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10. Interior doors to bedrooms are capable of being secured in the open position.
11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest non-bedroom space.

(Portions of proposal not show remain unchanged)

Commenter's Reason: The climate in tropical islands is uniquely constant, with moderate temperatures year around. Parts I and II of CE66 create a tropical climate zone, which is a subset of IECC climate zone 1. Part II also creates a residential "deemed to comply" option for the tropical island climate based on their traditional residential construction.

Part II of this change was approved by the residential IECC committee with the reason that the "*options are appropriate to a unique climate zone*". Part II included the option for traditional construction that lowers energy use by taking advantage of the moderate tropical climate. The modifications to Part II in this public comment do not apply to Part I, so Part I is simply "as submitted".

These changes were made based on comments received, both at the hearing and afterwards.

1. The first modification deals with high elevations in Hawaii, where a 2400 feet above sea level limit was added. Commenters noted the difference between inland Hawaiian climates at higher elevations and the coastal Hawaiian climates. (By far the highest tropical island elevations occur in Hawaii.) Commenters noted that the traditional construction that might work well in coastal Hawaii and other islands, but would not work well at the higher Hawaiian elevations. Therefore, the "deemed to comply" option is limited to elevations below 2400 feet above sea level; because that elevation is already used in the Hawaiian energy code. In reality this has limited effect because less than 2% of the Hawaiian population lives above that level.

Two other comments resulted in changes.

2. The term "roof" was changed to "roof/ceiling" to cover both possible locations for insulation (item #6).
3. The "bedroom walls" became "exterior bedroom walls" which was implied, but not stated (item #9). Exterior walls are the best source of the tropical breezes that help keep the residences comfortable and lessen the need for energy. Other comments did not result in changes.

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As in the existing IECC climate zones, the proposed tropical climate zone is based on Köppen's classification of climates. Köppen divided the earth's climates into five major types of climates, one of the climate types being "tropical". According to Köppen, tropical climates are characterized by constant high temperature (at sea level and low elevations) — all twelve months of the year in the proposed zone in question have average temperatures of 18 °C (64.4 °F) or higher[6]. The existing IECC zone 1 boundary and the proposed tropical climate zone are based on the Köppen temperature criteria for Köppen's "tropical zone".

Traditional tropical construction works best where temperatures are relatively constant and relatively warm. Köppen's tropical climates define a region with a large solar radiation that is relatively constant from month to month, ensuring both high temperatures and almost an absence of seasons. Typically, the temperature difference between day and night is greater than that between the warmest and the coolest month, the opposite of other climate zones[7].

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Some argued that the proposed "deemed to comply" option might not be as energy efficient as the current zone 1 code. An energy analysis for Puerto Rico was reference #1 in the original proposal. Many parts of the "deemed to comply" option are taken from or adapted from the current Hawaiian energy code and/or the Puerto Rican energy code. Specifying that half the occupied space is neither cooled nor heated is a significant reduction in energy use. Specifying 80% of the water heating is solar water heating (renewable energy) saves considerable energy in a region where water heating is a big end use for energy (see reference #2 in the original comment).

Some argued that the tropical zone SHGC should be the same as the Zone 1 SHGC in the IECC, which is an SHGC of 0.25. SHGCs of 0.25 usually mean double pane windows. Due to the warm and constant outdoor temperature, these windows are not remotely cost-effective in the tropical zone. The current Puerto Rico Energy Code has a requirement for 0.40 SHGC. The Tropical Energy Code, in use in Guam and elsewhere, has no requirement for residential SHGC. A jalousie window or louvered windows, common in the tropics and often constructed locally, often have no low SHGC coating, so this is an increased requirement for most of them.

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A "deemed to comply" option for the tropical island climate based on their traditional residential construction would provide an economical option for improving energy efficiency in the tropical island climate.

References:

1. Climate classification for building energy codes and standards: Part 1—Development Process. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
2 . Climate classification for building energy codes and standards: Part 2—Zone definitions, maps, and comparisons. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
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6. The is a short description of tropical climates in http://en.wikipedia.org/wiki/Tropical_climates
7. Weather Channel data demonstrates the constant temperatures in the tropical islands.

Google " weather channel average monthly temperature city_name state_name".
For example "weather channel average monthly temperature San Juan Puerto Rico"
Click first Google hit. Click boxes for "extreme high" and "extreme low". Compare tropical and non-tropical cities if you like.

Public Comment 2:

Greg Thielen, President, Building Industry Association of Hawaii (BIA-Hawaii); Tim Waite, Code Committee Chair, request Approval as Submitted.

Commenter's Reason: BIA-Hawaii supports this amendment, as submitted, because it proposes to create a Tropical Climate Zone in the IECC and include the State of Hawaii.

Hawaii's Unique Climate

Currently, Hawaii is included in Climate Zone 1A (Table 301.1, IECC). However, Hawaii's climate includes 11 of the world's 13 climate zones, making us vastly unique from the southern tip of Florida. Due to this unique climate, most homes are built with **NO CONDITIONED SPACE**. This is because most of Hawaii has only two seasons – summer, from May to October, and winter, from November to April.[1] Temperatures at sea level range from highs of 85-90°F in the summer to 79-83°F in the winter. Temperatures rarely rise above 90°F or drop below 60°F; most of the State's population reside in this moderate temperature area.

Hawaii also enjoys steady and cool breezes, or trade winds, brought from the northeast, that sweep through the Islands at an average of 12 miles per hour. Trade winds are generally steady during the summer months and weaker and inconsistent in the winter. These trade winds serve as Hawaii's natural air conditioning, keeping the islands cool in the summer and warm in the winter.

IECC Provisions Increase Costs of Construction in Hawaii

Our year-round comfortable temperatures, coupled with trade winds, allows for homes to be built using passive cooling. Traditionally, homes were built on "post and piers" (or crawlspaces), with jalousie windows, to take advantage of the cool breezes. Requiring homes to be sealed or mechanically ventilated is counterproductive to achieving energy conservation and consumption goals. Not recognizing this unique climate also imposes a financial burden on Hawaii's builders and consumers. Mechanically conditioned space represents a large, unnecessary investment in the cost of home construction. Production builders on Oahu cite initial A/C construction costs at under $15,000 per home. This cost can be three times more for custom or infill homes. Typical split AC units start at $2,000 per room.

It is already very difficult for families to qualify for a mortgage; adding unnecessary construction costs will make it even more difficult.

IECC Impact on Housing Affordability in Hawaii

Increased construction costs increase home prices, which impact affordability by the consumer. Median sales prices of single-family homes in Hawaii are as follows: City and County of Honolulu: $677, 250; Maui County: $615,000; Kauai County: $530,000; and Hawaii County: $355,000.[2] By stark contrast, median household incomes by Counties are as follows: Honolulu: $71,263; Maui: $64,583; Kauai: $64,422; and Hawaii: $53,591.[3] Adding unnecessary construction costs make it more difficult for families to qualify for a mortgage.

1. Hawaii's Climate. Hawaii Tourism Authority. Retrieved July 15, 2013, from http://www.gohawaii.com.
2. June 2013 MLS Statistics. Realtors Association of Hawaii.
3. State and County QuickFacts. U.S. Department of Commerce, U.S. Census Bureau. Retrieved July 15, 013, from http://www.quickfacts.census.gov.

The proposal to create a Tropical Climate Zone is essential and makes tremendous sense, as the existing limate Zone 1A does not take into consideration Hawaii's unique environment, imposes an unneeded and unwanted mandate on the home construction process, and increases the cost of home ownership.

Public Comment 3:

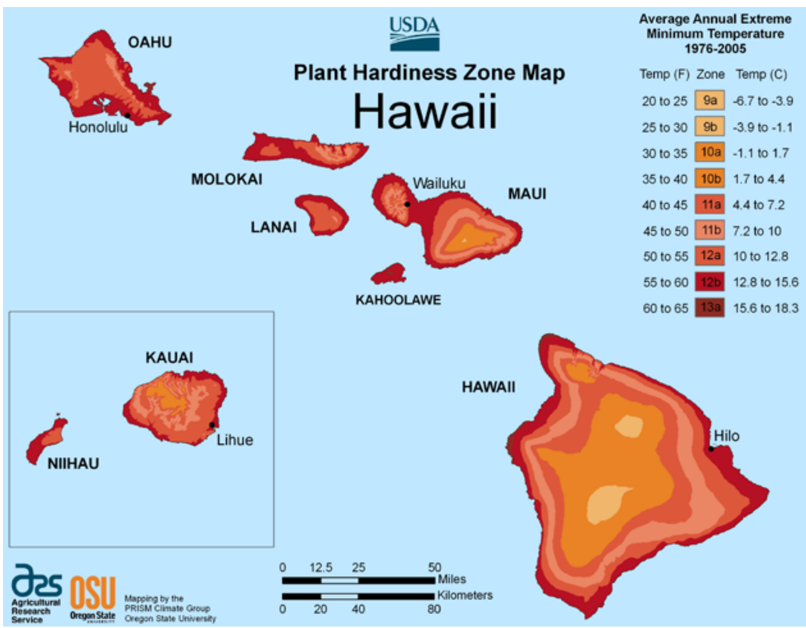
Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of CE66, Part II. CE66, Part II should be disapproved because it creates an alternative compliance option that is weaker than the current IECC and is weaker than the code currently in place in Hawaii -- one of the jurisdictions it intends to cover. The proposed alternative path contains some interesting concepts, but also contains unnecessary weakening provisions. The failure to use "good code language" creates too many ambiguities to be used as an enforceable code, and building code officials will have great difficulty enforcing the requirements. In addition, the failure to technically justify the proposed climate zone or provide energy analysis of any type to support the proposal renders the proposal insufficient. "Informal conversations with those who live in tropical regions" is simply not enough to justify creating a new climate zone and compliance path that would affect all tropical locations whether the building is located in a hot, cold or temperate micro-climates. The following are some more specific reasons for disapproval:

- **Glazed Fenestration SHGC Requirement is Too Weak**. CE66 Part II permits up to 0.40 SHGC for glazing. Even though the proponent asserts that "limiting solar gains and providing ventilation is the energy focus for windows," this proposal would actually increase the allowable SHGC of the current IECC by 60%. The proponent also claims that tropical electrical prices are "usually over 20 cents per kWH." Allowing a 60% increase in SHGC will substantially increase energy use (and utility bills) for homeowners in these sun-soaked islands. And in at least one jurisdiction that CE66 Part II intends to cover – Hawaii – the current prescriptive SHGC requirement is 0.30 (based on the 2009 IECC). This proposal would create a significantly weaker alternative where it is unwise and completely unnecessary.
- **Exemption from SHGC Requirements for Overhangs is Bad for Energy Conservation**. CE66 Part II also includes a complete exemption from SHGC as long as glazing "has an overhang with a projection factor equal to or greater than 0.30." There has never been an overhang requirement or SHGC-overhang trade-off in the residential chapter of the IECC, and the proponent does not give any indication how this is to be calculated. Does the overhang apply to each

window? Which orientations must have overhangs? Is area-weighted averaging allowed? Even under the commercial chapter of the 2012 IECC, where an adjustment to SHGC is permitted for overhangs, a 0.30 projection factor would still only permit an increase in SHGC to 0.275 or 0.30, depending on orientation – not a complete exemption from the SHGC requirements altogether.

- **Proposal Language Creates More Questions than Answers**. The language of proposal CE66 Part II is confusing and unenforceable. For example, Section R406(1) specifies that "not more than half of the *occupied space* is air conditioned." It is not clear whether any thermal isolation is required between conditioned and unconditioned space (to ensure that air conditioning operates as intended). It is also not clear how this is to be calculated -- *occupied space* is not a defined term in the IECC. Section R406(9) requires that "[b]edrooms with walls facing two different directions have operable fenestration facing two directions." It is unclear mathematically how to construct a bedroom with walls facing only two directions – bedrooms typically have at least four walls, facing at least four different directions. If the intent was to require operable fenestration on two walls facing *opposite* directions or some other configuration, the language does not make that clear. Section R406(10) requires interior doors to bedrooms to be "capable of being secured in the open position." Could this provision be satisfied by tying a shoestring to the doorknob or placing a spare brick on the floor?
- **The Proposed New Climate Zone Has Not Been Justified.** The need for a new "tropical" climate zone has not been justified. Nor has the delineation of the zone for certain islands been justified. The climate zones currently in the code are the result of intensive research and analysis and the caretaker role for assuring that these climate zones are valid and correct has been assumed by US DOE for a number of years. New climate zones should not be created willy-nilly so that reduced requirements may be established for those zones. Moreover, the inclusion of Hawaii in the zone, which has numerous micro-climates as illustrated by the minimum temperature map shown below, is not justified. A more comprehensive climate zone definition is needed to account for the climate conditions in tropical zones with annual average minimum temperatures ranging from 20˚F near the center of the islands to 60˚F at the coastal locations.



Proposal CE66, Part II should be disapproved, just as CE66, Part I was correctly recommended for disapproval by the commercial energy committee. The proponent has not adequately demonstrated that a compliance option is needed in this particular region, and the proposed alternative significantly weakens and confuses the current code requirements.

CE66-13, Part II

Final Action: AS AM AMPC____ D

CE67-13, Part I
C303.1.4.1 (NEW), Chapter 5, R303.1.4.1 (N1101.12.4) (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of h ×ft2 × °F/Btu at a mean temperature of 75°F (24°C).

<u>**C303.1.4.1 Insulated siding.** The thermal resistance (*R-value*) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.</u>

Add new standard to Chapter 5 as follows:

ASTM

C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

Reason: This additional requirement is necessary so that the testing protocol is spelled out clearly as the valid method for testing of R-value for insulated siding.

The Federal Trade Commission agrees that ASTM C1363 is the appropriate test method for insulated siding and further supported specific protocol as a part of ASTM C1363, established in ASTM D7793, is in the spirit of the home insulation rule.

Without adding this information to the energy code, manufacturers could try to enter the home insulation/insulated siding marketplace with product that has not been tested appropriately for R-value. This addition will ensure that proper, close to field condition testing, is required for any type of insulated siding to qualify as home insulation and in the energy code. This will ultimately result in a manufacturer compliance requirement and create easy enforcement for the building official and energy specialists. It will also further ensure that insulated siding's determined R-value will be legitimate in determining energy performance calculations and consumer confidence that it will provide specific energy performance.

This is a photo of a test chamber and insulated siding being tested to ASTM C1363.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

C303.1.4.1 (NEW)-EC-DOBSON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM C1363-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Submitted

Committee Reason: The proposal establishes, in the code, the proper test method for these products. It is consistent for this class of materials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C303.1.4.1 Insulated siding. The <u>assembly</u> thermal resistance (R-value) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions. <u>The manufacturer's labeled insulation R-Value for insulated siding shall be the assembly R-value reduced by 0.6.</u>

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: Inspectors rely on the R-value on the insulation label. The IECC specifies R-values that are insulation only and does not include the R-value for other materials. Inspectors should not have to do a calculation, even a simple calculation, to get to the insulation R-value. Instead of requiring the inspector to do a calculation to get to the insulation R-value, as was approved in RE195, this requires that the correct insulation R-value be on the insulation.

The C1363 test measures the insulated siding as an assembly, including insulation and non-insulation layers. The C1363 test is fine for an assembly. However, when complying based on R-value, the IECC counts only the insulation R-value, not an R-value that includes the non-insulation material part of an assembly. The IECC is clear. Note the **bold sentence** in IECC Section R402.1.2 "R-value computation" which says

> "Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. **Computed R-values shall not include an R-value for other building materials** or air films**.**" (Emphasis mine).

Insulation should be labeled with the insulation R-value, as required for use with the IECC.

CE67-13, Part I
Final Action: AS AM AMPC____ D

CE67-13, Part II
C303.1.4.1 (NEW), Chapter 5, R303.1.4.1 (N1101.12.4) (NEW), Chapter 5

<u>Proposed Change as Submitted</u>

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R303.1.4 (N1101.12.4) Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of h ×ft2 × °F/Btu at a mean temperature of 75°F (24°C).

<u>**R303.1.4.1 (N1101.12.4.1) Insulated siding.** The thermal resistance (*R-value*) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.</u>

Add new standard to Chapter 5 as follows:

ASTM

C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

Reason: This additional requirement is necessary so that the testing protocol is spelled out clearly as the valid method for testing of R-value for insulated siding.

The Federal Trade Commission agrees that ASTM C1363 is the appropriate test method for insulated siding and further supported specific protocol as a part of ASTM C1363, established in ASTM D7793, is in the spirit of the home insulation rule.

Without adding this information to the energy code, manufacturers could try to enter the home insulation/insulated siding marketplace with product that has not been tested appropriately for R-value. This addition will ensure that proper, close to field condition testing, is required for any type of insulated siding to qualify as home insulation and in the energy code. This will ultimately result in a manufacturer compliance requirement and create easy enforcement for the building official and energy specialists. It will also further ensure that insulated siding's determined R-value will be legitimate in determining energy performance calculations and consumer confidence that it will provide specific energy performance.

This is a photo of a test chamber and insulated siding being tested to ASTM C1363.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

C303.1.4.1 (NEW)-EC-DOBSON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM C1363-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This proposal adds requirements for a product that is currently referenced in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R303.1.4.1 Insulated siding. The <u>assembly</u> thermal resistance (R-value) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions. <u>The manufacturer's labeled insulation R-Value for insulated siding shall be the assembly R-value reduced by 0.6.</u>

Commenter's Reason: Inspectors rely on the R-value on the insulation label. The IECC specifies R-values that are insulation only and does not include the R-value for other materials. Inspectors should not have to do a calculation, even a simple calculation, to get to the insulation R-value. Instead of requiring the inspector to do a calculation to get to the insulation R-value, as was approved in RE195, this requires that the correct insulation R-value be on the insulation.

The C1363 test measures the insulated siding as an assembly, including insulation and non-insulation layers. The C1363 test is fine for an assembly. However, when complying based on R-value, the IECC counts only the insulation R-value, not an R-value that includes the non-insulation material part of an assembly. The IECC is clear. Note the **bold sentence** in IECC Section R402.1.2 "R-value computation" which says

> "Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. **Computed R-values shall not include an R-value for other building materials** or air films**.**" (Emphasis mine).

Insulation should be labeled with the insulation R-value, as required for use with the IECC**.**

CE67-13, Part II
Final Action: AS AM AMPC____ D

CE69-13
C401.1

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C401.1 Scope. The provisions ~~requirements contained~~ in this chapter are applicable to commercial *buildings* and their *building sites* ~~or portions of commercial buildings~~.

Reason: This proposal includes building sites in the scope of the IECC (consistent with C101.2). The other ICC codes use the terminology "provisions in this chapter…." The code was revised during the last code development cycle to clarify that building sites associated with the building are included due to the scope of the provisions in the lighting chapter. There is no need to include "or portions of commercial buildings" because that higher level scope is covered in Chapter 1.

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

C401.1-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that adding 'building sites' was too broad and might be confusing. They did not want to see site elements regulated not currently covered by the code, but they recognized that the site may be the location of systems or portions of systems that service the building.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: At the code development hearing, the reason statement for the code change proposal was presented. There was one party in opposition to the change who indicated that this would be confusing as the provisions in Chapter 4 deal with buildings and not building sites. DOE replied that there are currently provisions in Chapter 4 that are not in or on the building but are on the building site and that these provisions have been there for some time. Further, during the code development cycle leading to the 2012 IECC, a definition of building site was added to the code and Section 101.2 of the code (scope) was clarified to specifically include building sites, as follows:

> **C101.2 Scope.** This code applies to *commercial buildings* and the **buildings sites** and associated systems and equipment. *[emphasis added]*

The reason for disapproval was a concern by the committee that building "sites" might be too broadly interpreted or confusing. This scope is in the current code (as noted above), and DOE is not aware of any resulting confusion.

As discussed during the prior code development cycle, there are provisions in Chapter 4 of the IECC that apply to items not in or on buildings (i.e., not associated with the building footprint). These include exterior lighting, snow melt systems, outdoor pools and spas, and, in some cases, any HVAC or SWH equipment and associated systems that are located on the site but remote from the building. In disapproving the code change, the committee recognized that such regulated items are located on the building site. This change is not focused on other items associated with the building site, such as solar access, trees, grading or other items associated with a building site. The change is strictly intended to recognize the validity of certain items already included in Chapter 4, and to make Chapter 4 consistent with Section 101.2 of the current code. There have been and are items covered by the code that are technically outside the scope of the code. Without this clarification of scope, a loophole exists: systems and equipment serving the building could be located outside the building and considered unregulated.

In recommending disapproval, the committee noted a concern about regulating site elements that are not currently covered by the code. This should not be a concern, because where there are actual criteria in the code for items on the site rather than in the building, the items covered by the criteria would be regulated, and if no requirements are provided in the code for these items, there is nothing to regulate.

The current code has in its scope buildings and building sites, both of those terms are defined and the provisions in the code are applicable to one or the other. There is no reason why the scope of Chapter 4, Commercial Energy Efficiency, should not be consistent with Section C101.2 of the IECC and officially recognize those current items in Chapter 4 that occur outside the building footprint but are already addressed in the code.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE69-13

Final Action: AS AM AMPC____ D

CE70-13
C401.2, C401.2.1

Proposed Change as Submitted

Proponent: Larry Spielvogel, PE, FASHRAE, representing self

Revise as follows:

C401.1 Scope. The requirements contained in this chapter are applicable to commercial buildings, or portions of commercial buildings.

C401.2 Application. Commercial buildings shall comply with one of the following:

~~1. The requirements of ANSI/ASHRAE/IESNA 90.1.~~
~~2.~~ 1. The requirements of Sections C402, C403, C404 and C405. In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.
~~3.~~ 2. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

C401.2.1 Application to existing buildings. Additions, alterations and repairs to existing buildings shall comply with one of the following:

1. Sections C402, C403, C404 and C405; or
~~2. ANSI/ASHRAE/IESNA 90.1~~.

Reason: The purpose of this code change is to delete the current option that exists to use ASHRAE 90.1 in lieu of all of the requirements in Chapter 4 of the Commercial Provisions in the IECC. This code change will make the IECC simpler, less expensive to use, easier to learn, and will prevent people from using ASHRAE 90.1 to get around the provisions of IECC Chapter 4 and other I Codes, such as the IMC.

1. ASHRAE 90.1-2013 Is Not and Will Not Be Available. Just like in previous code cycles, ASHRAE is not likely to publish an ANSI approved version of 90.1-2013 until just before or during the Final Action Hearings in Atlantic City in October 2013. Thus, it is not possible to see even a working draft of 90.1-2013 by the Committee Action Hearing in Dallas in April, and it may not even be possible to see the final published and ANSI approved 90.1 before the Final Action Hearings in October.

Therefore, any proposal to allow ASHRAE 90.1-2013 or even a working draft to be used by anyone in lieu of all of the specific requirements in IECC Chapter 4 is just not fair or equitable. ASHRAE must follow the ICC rules, just like all other consensus documents that are referenced, by providing ANSI approved and published copies well before the hearings. Otherwise, it is not possible for the IECC Committee or the ICC Members and the public to adequately review, comment, and testify on the content and provisions of the specific version of ASHRAE 90.1 that will be adopted.

2. ASHRAE 90.1 Circumvents IECC Requirements. The current option to use the less stringent ASHRAE 90.1 in lieu of all of the requirements in IECC Chapter 4 provides any user with multiple ways to circumvent many of the IECC and other I Code requirements. Thus, compliance with ASHRAE 90.1 can be less stringent than with IECC Chapter 4 compliance. It will not be possible for anyone to know until after all changes are made and adopted at the Final Action Hearings whether ASHRAE 90.1 is at least as stringent as Chapter 4 of the IECC. If 90.1 is not at least as stringent as Chapter 4, then you will allow these less stringent requirements in 90.1 to be used at will, defeating the purpose of having an energy code.

At least some of the lighting provisions in ASHRAE 90.1 (as yet unknown) are likely to be less stringent than those in C405.5.2(1) and (2) of IECC. ASHRAE 90.1 also allows additional lighting power allowances in that can be much higher than those in the footnotes to IECC Table C405.5.2(2). The IECC should not allow people to unilaterally circumvent IECC voted and adopted lighting power allowances without justification and public hearings. As another example, IECC C402.4.5.1 and C402.4.5.2 require the use of the 2010 AMCA standard 500D for dampers in Chapter 4, while ASHRAE 90.1-2010 requires the use of the 2007 AMCA Standard 500D in Section 12, and then only for damper leakage, while IECC requires AMCA 500-D-2010 for both damper leakage and for stairway and shaft vents. Thus, the option to use ASHRAE 90.1 circumvents the IECC required use of the current 2010 AMCA damper standard and ASHRAE 90.1 does not require its use in as many places as does the IECC.

3. ASHRAE 90.1 Is Unenforceable. ASHRAE 90.1 is unenforceable because the requirements are so numerous and so complex that most code officials do not have and cannot readily or economically get the extensive training and experience to be able to understand and enforce the ASHRAE 90.1 requirements. ASHRAE 90.1 has many more requirements than the IECC. The 2012 IECC is 89 pages, while 90.1-2010 is already 228 pages, with over 100 more new addenda to be included in the 2013 edition. The ASHRAE 90.1-2010 User's Manual is another 469 pages long. There are almost no local training courses or training programs on ASHRAE 90.1 at the many locations and jurisdictions where the IECC is adopted that are specifically for code officials. At best, there may be a dozen or so competent and comprehensive training programs on ASHRAE 90.1 each year in the entire country, mostly in a few major cities, and none of those is specifically for code officials. Learning and completely understanding ASHRAE 90.1 is also difficult even for most practicing architects, engineers, and contractors, making it difficult for them to comply, thus imposing an even greater burden on code officials to verify compliance.

Even the ASHRAE 90.1 committee itself has difficulty writing and understanding the standard, since they issue hundreds of addenda, errata, formal interpretations, and informal interpretations every year in attempts to change or clarify their intent and rectify their own numerous errors. The one-year-old addenda for ASHRAE 90.1-2010 is 44 pages long and many more pages are coming. So far, ASHRAE has issued 14 errata sheets to 90.1-2010. The addenda to 90.1-2007 that were incorporated into 90.1-2010 are designated from a to dr. The addenda so far to 90.1-2010 that will be incorporated into 90.1-2013 are designated from a to cr. Thus, the criteria, requirements, and corrections for ASHRAE 90.1 change almost weekly. Nor are the changes from the prior edition clearly marked by ASHRAE, as they are in the IECC, so the reader can readily see the changes and deletions. Which of these many documents and provisions are to be applied and enforced for any specific permit application on any specific day?

4. ASHRAE 90.1 is Not Coordinated. The IECC is carefully coordinated with the other International Codes, and ASHRAE 90.1 is not. This results in conflicts and contradictions. For example, just Chapter 4 of the IECC has at least eleven references to and requirements for compliance with the other International Codes, while ASHRAE 90.1 has not one. While some of the provisions in IECC are similar to ASHRAE 90.1, ASHRAE 90.1 has many more requirements and exceptions that do not exist in the IECC, providing more latitude and less stringency for users than in the IECC and other I Codes.

5. ASHRAE 90.1 is Not Unified. Providing the option to use ASHRAE 90.1 in lieu of IECC Chapter 4 diverts efforts from pursuing a unified and comprehensive set of International Codes. The option to use ASHRAE 90.1 in lieu of IECC Chapter 4 provides an unsupervised and unmonitored path for special and vested interests to include their provisions in ASHRAE 90.1 that would never be accepted in the IECC. For example, ASHRAE does not hold any public hearings on any changes to or on the entire standard. Thus, the “back door” to ASHRAE 90.1 opens wider than that for the IECC, especially since so many of the ASHRAE 90.1 voting members work for or represent special interests, so they can pursue those interests from the inside. For example, a significant percentage of the members of the ASHRAE 90.1 Mechanical Subcommittee are employed by manufacturers of heating, air conditioning, and water heating equipment, or by their trade associations. Most of the other voting members of the ASHRAE 90.1 Committee do not know enough to debate and vote intelligently on those issues, which are then adopted and included in the Standard. As another example, the majority of the voting members of the ASHRAE 90.1 Committee know little or nothing about lighting, so there is a great tendency to “rubber stamp” recommendations that come from the Lighting Subcommittee. Accordingly, many provisions in ASHRAE 90.1 diverge from those in IECC.

6. ASHRAE 90.1 Copies Unavailable. ASHRAE does not normally offer and provide free copies of 90.1 ($125 per copy last year plus another $99 for the User’s Manual) to code officials. Very few code jurisdictions have budgets to purchase copies of the ASHRAE documents for each plan checker and inspector; much less the estimated thousands of dollars per user to purchase the many mandatory ASHRAE references (beyond those in the IECC) needed to determine compliance. Few code jurisdictions, and similarly few architectural, engineering, or construction firms have the sophisticated software, training, and experience, much less the time and computers required to run and check the 90.1 Section 11 Energy Cost Budget (ECB) Method calculations allowed by ASHRAE 90.1 for further compliance options.

7. The Use of ASHRAE 90.1 is Not Precluded. Most, if not all relevant provisions of ASHRAE 90.1 can still be used at the discretion of the user, so long as they are at least as stringent as Chapter 4 of IECC. People who wish to comply with ASHRAE 90.1 for any other reasons, such as, but not limited to LEED® certification can still easily do so, provided they also meet the requirements of Chapter 4 of IECC.

Cost Impact: This code change proposal will not increase the cost of construction. There will be a very substantial cost savings since code officials and users of the IECC will not have to buy additional standards and references or spend the time and pay for additional training. The provisions proposed in this code change for deletion are simply optional already in the IECC, and no other provisions in the IECC will be changed or affected.

C401.2-EC-SPIELVOGEL.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt that ASHRAE 90.1 needs to be retained as a compliance option as a total document. There are also many segments of the code that rely on ASHRAE 90.1 as a background. De-coupling the Standard from the code is more complex than a simple deletion in this section.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Larry Spielvogel, P.E., FASHRAE, representing self, requests Approval as Submitted.

Commenter's Reason: This public comment asks approval as submitted for code change proposal CE70 – 13. This proposal was disapproved at the Dallas hearings in April. No reasons or support was provided for the disapproval statement in the Committee Action Report, "There are also many segments of the code that rely on ASHRAE 90.1 as a background." The content of the IECC is substantially independent of ASHRAE 90.1. By voting to disapprove this public comment, you are voting to approve the automatic option for anyone to use ASHRAE 90.1-2013 that no one has seen or has been able to review before coming to Atlantic City in lieu of the 2015 IECC.

There are now more than one hundred new addenda to ASHRAE Standard 90.1-2010, some as much as 24 pages of fine print that substantially modify and expand what is required. These addenda will appear in ASHRAE Standard 90.1-2013 when it is published. Even though most of those addenda have been approved by ASHRAE and ANSI, they are still not publicly available as of this date, and probably will not be available in advance for the Atlantic City October Final Action Hearings. ASHRAE refuses to publish or make available many of these approved addenda. Therefore, by rejecting code change proposal CE70 – 13, you will be automatically condoning and approving hundreds of pages of ASHRAE addenda that no one outside of the ASHRAE committees has seen or reviewed.

Some of the many changes and addenda that will appear in ASHRAE Standard 90.1-2013, which will be automatically appear as an automatic option in the 2015 IECC, have been explicitly disapproved for the 2015 IECC at the Dallas Committee Action hearings in April. Therefore, depending on each particular project, the optional use of ASHRAE 90.1 will be less stringent than the IECC.

ASHRAE and ANSI approve and publish some of the Standard 90.1 addenda, "with knowledge of unresolved comments," thus not providing an open process or due process. While ASHRAE claims that Standard 90.1 is prepared in an ANSI approved consensus process that is hardly the case. ASHRAE has no public hearings on any of their addenda nor any public reviews on the complete content of Standard 90.1.

ASHRAE does not include markings in their published standard showing all changes and deletions, like the IECC. Rather, they do offer a separate redline version of Standard 90.1, currently at a cost of an additional $156. In the past, this has shown the hundreds of changes and deletions from the prior published version. There is no evidence that ASHRAE provides the redline version to Code Officials at no cost.

CE70-13
Final Action: AS AM AMPC____ D

CE71-13
C401.2, C406

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402, C403, C404 and C405. ~~In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.~~
3. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than ~~85~~ 90 percent of the standard reference design building.

Delete without substitution as follows:

~~SECTION C406~~
~~ADDITIONAL EFFICIENCY PACKAGE OPTIONS~~

Reason: Stringency increases in the energy codes don't necessarily mean energy savings. Parts of the energy code are usually ignored. The sections eliminated here were added primarily to increase stringency, not because they solve a problem.

Most parts of Section C406 are problematic. As the Federally required equipment efficiency changes, the heating and cooling equipment in Section C406.2 will become out of date. As Federal minimum equipment efficiency requirements change the tables in Section 406.2 will become out of date; for example, the minimum air conditioner and heat pump efficiencies just changed. The minimum furnace efficiencies are expected to change in the next few years. Efficiencies sufficiently above the Federal requirements to be in that table may not even be available for some types of equipment. The solar renewable option in C406.4 will be difficult in dense urban settings, for example when buildings shade other buildings, or worse, when future buildings end up shading existing buildings where the renewables were dependent on sunshine. If efficient equipment is unavailable and renewables are impractical due to shading, the only remaining option is a lower lighting power density (LPD) in Section C406.3. The LPDs could be quite a challenge-- most required LPDs in Section C406.3 are more restrictive than ASHRAE's green standard (ASHRAE 189.1).

The goal of Section C406 was to reduce energy use by 5%. The 85% factor in Section C401.2 includes that 5%, so it is increased to 90% by this change to align it with the deletion of Section C406.

The IECC is changing too fast and becoming too complicated. We need to let code enforcement and those using the code catch up. The code complexity has outpaced the code enforcement community's ability to absorb more and more requirements. At some point we have to ask what is the contribution to energy efficiency for requirements that are not implemented? Or worse, what is the contribution for requirements that alienate potential users of the energy code to the point that they don't enforce, or even adopt, the IECC?

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

C401.2-EC-CONNER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was not convinced that the provisions requiring additional savings should be removed. The provisions provide choices to the designers in meeting the additional stringency that is not present in other portions of the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Craig Conner, Building Quality, representing self, requests Approval as Submitted.

Commenter's Reason: There seems to be a discouraging trend to add more and more requirements and words to the code, move words around without making real changes, add calculations and tables that are not well understood, and to add sections that are often eliminated or at least not enforced. Then we declare victory and calculate the energy savings. I believe the energy savings in the real world are negative. The cost of complexity in the code world is a lack of compliance and enforcement. We need to get back to a simpler code that is actually used and enforced. This section is often deleted. The whole of Section C406 should be removed from the code.

Public Comment 2:

Steve Rosenstock, Edison Electric Institute, requests Approval as Submitted.

Commenter's Reason: This proposal should be approved as submitted for the following reasons:

-In the Dallas hearings, the code development committee approved many measures that will increase the energy efficiency of all commercial buildings in the areas of lighting, envelope, heating equipment efficiency, cooling equipment efficiency, motor efficiency, transformer efficiency, exhaust system efficiency, commercial refrigeration efficiency, and controls (for lighting and mechanical equipment).

-The additional efficiency package for the 2012 IECC was designed to improve building energy efficiency by about 3%. All of the actions taken by the code development committee for the 2015 IECC have achieved that goal.

-There are many above code programs and standards, such as the ICC *International Green Construction Code*, LEED, ASHRAE Standard 189.1, ICC-700 *National Green Building Standard*, and several others that result in buildings that are more energy efficient than buildings built to baseline codes.

CE71-13

Final Action: AS AM AMPC____ D

CE74-13
C401.2, C401.2.1, Chapter 5

Proposed Change as Submitted

Proponent: Michael A. Anthony, P.E., University of Michigan, representing US Education Facilities Industry – APPA.ORG – Leadership in Education

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections 502, 503, 504 and 505. In addition, commercial buildings shall comply with either Section 506.2, 506.3 or 506.4.
3. The requirements of Section 507, 502.4, 503.2, 504, 505.2, 505.3, 505.4, 505.6 and 505.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.
4. The requirements of ISO 50001.

401.2.1 Application to existing buildings. Additions, alterations and repairs to existing buildings shall comply with one of the following:

1. Sections 502, 503, 504 and 505; or
2. ANSI/ASHRAE/IESNA 90.1.
3. The requirements of ISO 50001.

Add new standard to Chapter 5 as follows:

ISO

50001-2011 Energy management systems – Requirements with guidance for use.

Reason: The US education facilities industry believes that a performance standard such as ISO 50001 is a more economical and faster path to meet our industry's energy conservation goals for the following reasons:

1. ISO 50001 provides a flexible template for states and local jurisdiction to implement local energy conservation programs that are most effective for their climates, risk aggregations and economy. For example, Section 4.4.4 of ISO 50001 states:

"The organization shall establish an energy baseline(s) using the information I the initial energy review, considering a data period suitable to the organization's energy use and consumption. Change in energy performance shall be measured against the energy baseline(s)"

2. The US Department of Energy (DOE) supports the ISO 50001 Standard as a proven approach for U.S. industrial and commercial facilities to plan, manage, measure, and continually improve energy performance.

Note to Committee: release of restricted copies of ISO 50001 for committee examination is in process

Cost Impact: The code change proposal will not increase the cost of construction. Lower cost because local jurisdictions will be able to a) establish their own baselines, and b) scale into energy conservation measures as technical and budget conditions allow as long as they meet established goals.

Analysis: A review of the standard proposed for inclusion in the code, ISO 50001-2011 Energy management systems – Requirements with guidance for use, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C401.2-EC-ANTHONY

Committee Action Hearing Results

For staff analysis of the content of ISO50001-2011 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf.

Committee Action: **Disapproved**

Committee Reason: The proposed standard is only an energy management standard that would apply to a building once constructed. It contains no standards for the construction of a building.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Anthony, University of Michigan, representing APPA.org Standards and Code Council, requests Approval as Submitted.

Commenter's Reason: The Committee's reason for rejection – "*The proposed standard is only an energy management standard that would apply to a building once constructed. It contains no standards for the construction of a building"* – does not take into consideration the following passage:

4.5.6 Design

The organization shall consider energy performance improvement opportunities and operational control in the design of new, modified and renovated facilities, equipment, systems and processes that can have a significant impact on its energy performance.

The results of the energy performance evaluation shall be incorporated where appropriate into the specification, design and procurement activities of the relevant project(s)

The results of the design activity shall be recorded.

The strength of ISO 50001 document lies in how it establishes the broad contours of solutions for the energy conservation problem but permits industries and organizations to set their own benchmarks. By treaty. ISO documents should at least be referenced in US standards where appropriate.

CE74-13

Final Action: AS AM AMPC____ D

CE75-13
C401.2.2 (NEW)

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Add new text as follows:

C401.2.2 Application to replacement fenestration products. Where some or all of an existing *fenestration* unit is replaced with a new *fenestration* product, including sash and glazing, the replacement *fenestration* unit shall meet the applicable requirements for *U-factor* and *SHGC* in Table C402.3.

> **Exception**: An area-weighted average of the *U-factor* of replacement fenestration products being installed in the building for each fenestration product category listed in Table C402.3 shall be permitted to satisfy the *U-factor* requirements for each fenestration product category listed in Table C402.3. Individual fenestration products from different product categories listed in Table C402.3 shall not be combined in calculating the area-weighted average *U-factor*.

Reason: The purpose of this code change is to create a new code section to clarify that whenever an entire new fenestration product or assembly replaces some or all of an existing fenestration product (typically in the remodeling or modernizing of an existing building), the new fenestration product must meet the U-factor and SHGC requirements of the fenestration table. Section C401.2.1 of the 2012 IECC already requires that additions, alterations and repairs comply with C402 (thermal building envelope) – as a result this proposal does not add any additional requirements. However, this proposal will further clarify the application of the requirements, increase effective enforcement, and reduce the likelihood of confusion and differing interpretations:

- This proposed commercial fenestration requirement is identical to the residential requirement in Section R402.3.6. This specific requirement has been in the residential chapter of the IECC since at least the 2000 *IECC*. The exception adds additional flexibility by allowing the U-factor requirement to be satisfied on a weighted average basis by product category consistent with the current area-weighting approach to U-factor in section C402.3.4.
- Existing buildings represent one of the greatest untapped sources of energy efficiency, yet there are few ways to effectively require improvements to these buildings. This section does not mandate the replacement of windows; however, if windows are going to be replaced, the code should expressly require that the replacement windows achieve the same efficiency level as windows in newly constructed buildings.
- There is no valid reason why replacement windows cannot meet the same thermal efficiency requirements as windows installed in new buildings, so there is no reason to have separate requirements for them.
- Common repairs to damaged windows, such as the replacement of a broken pane of glass, would not be covered under C401.2.2.

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

C401.2.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was approved so that the code provides direction on replacement fenestration. The committee did express concern that provision was overly restrictive where only one or a few windows were replaced, resulting in unmatched fenestration on a building's facade.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~C401.2.2~~ C101.4.3.1 ~~Application to~~ Replacement fenestration ~~products~~. Where some or all of an existing *fenestration* unit is replaced with a new *fenestration* product, including sash and glazing, the replacement *fenestration* unit shall meet the applicable requirements for *U-factor* and *SHGC* in Table C402.3.

> **Exception**: An area-weighted average of the *U-factor* of replacement fenestration products being installed in the building for each fenestration product category listed in Table C402.3 shall be permitted to satisfy the *U-factor* requirements for each fenestration product category listed in Table C402.3. Individual fenestration products from different product categories listed in Table C402.3 shall not be combined in calculating the area-weighted average *U-factor*.

Commenter's Reason: The intent of the proposed modification is to relocate the proposed text to be located with other existing building provisions of the Commercial IECC. At present that is Section C101.4.3. This is a special provision regarding alteration of fenestration. It should not be located in provisions applying to new construction. CE4 was approved which creates an Existing Buildings chapter. Assuming CE4 receives final approval from the membership, the provisions of C101.4.3 are relocated into Chapter 5. These provisions would move along with it to be placed in the provisions addressing the alteration of buildings.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE75-13
Final Action: AS AM AMPC____ D

CE82-13
C402.1.1, C402.1.2, C402.2.4

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables C402.2 and C402.3, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1. <u>The thermal resistance or R-value of the insulating material installed in, or continuously on, below grade exterior walls of the building envelope required in accordance with Table C402.2 shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.</u>

C402.1.2 *U*-factor alternative. An assembly with a *U-factor*, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2. <u>The C-factor for the below grade exterior walls of the building envelope, as required in accordance with Table C402.1.2, shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.</u>

~~**C402.2.4 Thermal resistance of below grade walls.** The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2, and shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.~~

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

This proposal moves and clarifies, but does not delete the provisions of Section C402.2.4 of the 2012 IECC.

As originally written, Section C402.2.4 requires that both the R-value and the U-factor methods of Sections C402.1.1 and C402.1.2 comply with the R-values for above grade wall insulation indicated in Table C402.2. However, only R-values are listed in Table R402.2. It does not make sense to require the U- factors method of Table R401.1.1, which contains values for below grade insulation, to also comply with the R-value method for below grade insulation. Section C402.2.4 is really intended to require that the thermal properties required for below-grade walls under either method extend at least 10 feet below grade or to the floor level, whichever is less. This proposal clarifies that by adding footnotes to the tables associated with both of these methods. It is only by the application of these tables that this information becomes relevant. Where these requirements are currently located they become disconnected and their application to the tables becomes unclear and unlikely.

Note that the R-values in Table C402.2 are based on analysis of the insulation components only. Although a wall without any insulation would have an R-value of 0, it has a C-factor of 0.1140. This is because the U-values for walls in Table C402.1.2 are based on the impact of all components of the building envelope assembly, not just the insulation components. The values in Table C402.1.2 consider the impact of all materials that compose each building envelope assembly, including whether block, wood stud, metal stud, solid concrete or other materials are used, and the amount of and location of the insulation components. Because Tables C402.1.2 and C402.2 evaluate thermal properties in different ways, it is important that the thermal resistance of below grade walls are addressed in a manner that consistent with the manner that they are addressed in each table. This proposal accomplishes that goal and preserves the potential application of each table to below grade walls.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C402.1.1 #4-EC-THOMPSON-SEHPCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the code by making sure that both methodologies include text regarding the below grade walls.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables C402.2 and C402.3, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1. ~~The thermal resistance or R-value of the insulating material installed in, or continuously on, below grade exterior walls of the building envelope required in accordance with Table C402.2 shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.~~

C402.1.2 *U*-factor alternative. An assembly with a *U-factor*, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2. ~~The C-factor for the below grade exterior walls of the building envelope, as required in accordance with Table C402.1.2, shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less~~.

<u>**C402.2.4 Thermal resistance or conductance of below grade walls.** The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2. Alternatively, The C-factor for the below grade exterior walls of the building envelope shall be as specified in Table C402.1.2. Either shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.</u>

Commenter's Reason: It has long been understood that each component in both the residential and commercial tables have their own text section to go with them. This is why the application sections states that you have to comply with the listed Sections and not just the Table. We understand what the SEHPCAC Committee was trying to do here in clarifying the difference between the requirements in Tables C402.1.2 and 402.2 but they could have easily done it within the below grade wall Section so that we could keep the component section that accompanies the table. Placing the items in already wordy Sections C402.1.1 and C402.1.2 allows the verbiage to actually get lost in all of the text instead of clarifying it.

We would request this modification so that the component section stays intact while adding the language that the committee was worried about. The title has been changed to reflect the change to add C Factor, which is thermal conductance, as well.

CE82-13

Final Action: AS AM AMPC____ D

CE83-13

C402.1.2

Proposed Change as Submitted

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

Revise as follows:

C402.1.2 U-factor alternative. An assembly with a U-factor, C-factor, or F-factor equal to or less than that specified in Table C402.1.2 shall be permitted as an alternative to the R-value in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the U-factor, C-factor, or F-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the U-factor, C-factor or F-factor from the "All other" column of Table C402.1.2. <u>All U-factor and C-factor calculations shall take into account as applicable exposed edges of floor slabs.</u>

Reason: Slab edges are a location for heat loss and are frequently omitted from calculations.

Cost Impact: The change proposal will not increase the cost of construction. It adds no new energy requirement.

C402.1.2-EC-TAYLOR.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal introduces confusing text. The existing text already sufficiently addresses the issue.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Deborah F. Taylor, Deborah F. Taylor Consulting, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.1.2 U-factor alternative. An assembly with a U-factor, C-factor, or F-factor equal to or less than that specified in Table C402.1.2 shall be permitted as an alternative to the R-value in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the U-factor, C-factor, or F-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the U-factor, C-factor or F-factor from the "All other" column of Table C402.1.2. <u>Calculations of</u> ~~all~~ U-factor<u>s</u> and C-factor<u>s</u> ~~calculations~~ shall take into account ~~as applicable~~ exposed edges of floor slabs <u>where applicable</u>.

Commenter's Reason: Exposed slab edges transfer significant heat energy and are often overlooked in UA calculations. This is an alert that they must be addressed.

CE83-13

Final Action: AS AM AMPC____ D

CE84-13, Part I

C202 (NEW), C402.1.2.1 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), R402.1.3.1 (NEW) (IRC N1102.1.3.1 (NEW)), R402.1.4 (IRC N1102.1.4)

Proposed Change as Submitted

Proponent: Jay Crandell, ARES Consulting, representing American Chemistry Council- Foam Sheathing Committee (jcrandell@aresconsulting.biz)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**C402.1.2.1 Airspace *U*-factor.** Where the *U*–factor of an airspace enclosed within an assembly is used as part of the calculation of the assembly *U*-factor, the airspace shall be constructed as an *ideal airspace.* The thermal resistance of the air-space shall be determined in accordance with the ASHRAE *Handbook of Fundamentals* or tested in accordance with Section C303.1.4 for the applicable direction of heat flow. Where the air-space is not constructed as an *ideal airspace*, thermal resistance of the air-space shall not be included in the assembly *U*-factor.</u>

Add new definition as follows:

<u>**IDEAL AIRSPACE.** An airspace contained within a cavity of a field-built assembly that, where used to contribute to thermal resistance of the assembly, is bounded on all sides by solid materials with joints and gaps between bounding materials or holes in bounding materials sealed to prevent air movement into or out of the airspace.</u>

Reason: The ASHRAE Handbook of Fundamentals, Chapter 26, Table 3 lists the allowable thermal properties for airspaces in a variety of configurations. Footnote b to this table says in part " … Values apply for ideal conditions (i.e., air spaces of uniform thickness bounded by plane, smooth, parallel surfaces with no air leakage to or from the space)..". This concern is unique to the use of an air-space for thermal resistance for a number of reasons. First, an air-space creates a path of least resistance for any air infiltration and this makes air-space thermal performance particularly susceptible to loss of thermal performance due to air infiltration. The test basis and analytical basis of these airspace thermal values are based on ideal conditions or an "ideal airspace" that, most importantly, allows for no air leakage to or from the airspace. In essence, a field-built air-space is intended to trap air as well as sealed or manufactured mass insulation products that provide at least some resistance to air-movement. Furthermore, air-space thermal performance is dynamic, dependent on both heat flow direction and temperature difference. As such, use of the ASHRAE Fundamentals values for thermal resistance of airspaces requires the user to use boundary conditions similar to those used to establish the thermal values. Alternatively, the performance of non-ideal air spaces which allow some amount of air-leakage into or out of the airspace must have reduced (non-ideal) thermal performance qualified by appropriate testing with representative boundary conditions. Unfortunately, such a standardized test method does not currently exist. Without this proposal to provide clear enforceable language consistent the technical basis of airspace thermal performance, use of air-space thermal properties will continue to be determined based on ideal conditions that are often far from those actually provided in practice, resulting in performance that can be, in worst case, as little as 15% of that claimed based on ideal airspace conditions (refer to independent lab test data reported at http://fsc.americanchemistry.com/Energy-Code/Energy-Code-Compliance.pdf) .

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

C402.1.2.1 (NEW)-EC-CRANDELL.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proponent requested disapproval in order to develop a public comment which will address issues raised during the consideration of Part II.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.1.2.1 Enclosed airspaces. Where used to comply with building thermal envelope requirements, the thermal resistance of an enclosed air space shall be determined in accordance with the ASHRAE *Handbook of Fundamentals* or the assembly including the enclosed air space shall be tested in accordance with Section C303.1.4 in a manner representative of the materials and conditions of use and direction of heat flow. Where the thermal performance of an enclosed air space is determined by use of the ASHRAE *Handbook of Fundamentals*, the enclosed air space construction shall be of uniform thickness bounded by plane, smooth, parallel surfaces. In all cases, enclosed air spaces shall comply with the following:

1. Located to the interior side of a continuous air barrier installed in accordance with Section C402.4.1.2.
2. Separated from the interior of the building by an air-barrier material complying with Section C402.4.1.2.1.
3. Penetrations into or through the enclosed air space shall comply with Section C402.4.2.
4. Venting of the enclosed air space shall not be permitted.
5. Reflective surfaces, if used, shall face the enclosed airspace and shall be installed in a manner that prevents dust accumulation on the reflective surface during construction and use. In a horizontal enclosed air space, reflective surfaces shall be installed above the enclosed airspace facing downward.

C202
GENERAL DEFINITIONS

ENCLOSED AIR SPACE. An unventilated cavity located to the interior side of a continuous air-barrier and bounded on all sides with building components assembled together in a manner that prevents indoor or exterior air leakage into or from the cavity or between adjacent cavities, including sealing of penetrations.

Commenter's Reason: This proposal follows direction given by the code development committee at the first hearing in agreement that "better guidance is needed on the description of an air space that qualifies as contributing to the U-factor of an assembly."

Air-spaces are a viable means of contributing to compliance with thermal envelope requirements, but lack important and enforceable guidance in the code to ensure appropriate use. The ACC/FSC includes manufacturer members that have products capable of taking advantage of airspace thermal performance. But, the thermal resistance of field-built airspaces are particularly vulnerable to loss of performance if they are not adequately enclosed to prevent air-leakage into or out of the airspace as clearly required in the AHSRAE *Handbook of Fundamentals* and the scientific literature. A review of the scientific literature on this topic was conducted to guide this public comment and will be made available at fsc.americanchemistry.com.

While test methods for all insulation materials are conducted under conditions of no air leakage or pressure differentials that drive air-leakage into, through, and out of building assemblies, airspaces provide no resistance to air movement and they are particularly vulnerable to significant loss of thermal performance when air leakage is not adequately controlled. For example, one test report referenced in the original proposal's reason statement shows that only 15% of the normally claimed thermal performance may be achieved when air-spaces are not adequately enclosed, even when tested under conditions of no pressure differential to drive air movement through an assembly as would be typically experienced in end use due to building ventilation, HVAC pressure imbalances, buoyancy effects of interior air, and wind. In addition, the sensitivity of reflective surfaces (which are required to be used in conjunction with an airspace to provide any thermal value) to dust accumulation and heat flow direction are well-documented in the scientific literature. This proposal is coordinated with various existing provisions in the code to address the above concerns and to provide needed guidance for building officials to knowledgeably enforce and users to properly implement the appropriate use of airspaces for their ability to contribute to the thermal performance of buildings rather than erode the thermal performance intent of the code.

CE84-13, Part I

Final Action: AS AM AMPC____ D

CE84-13, Part II

C202 (NEW), C402.1.2.1 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), R402.1.3.1 (NEW) (IRC N1102.1.3.1 (NEW)), R402.1.4 (IRC N1102.1.4)

Proposed Change as Submitted

Proponent: Jay Crandell, ARES Consulting, representing American Chemistry Council- Foam Sheathing Committee (jcrandell@aresconsulting.biz)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

Revise as follows:

R402.1.3.1 (N1102.1.3.1) Airspace U-factor. Where the U–factor of an airspace enclosed within an assembly is used as part of the calculation of the assembly U-factor, the airspace shall be constructed as an *ideal airspace.* The thermal resistance of the air-space shall be determined in accordance with the ASHRAE *Handbook of Fundamentals* or tested in accordance with Section R303.1.4 for the applicable direction of heat flow. Where the air-space is not constructed as an *ideal airspace*, thermal resistance of the air-space shall not be included in the assembly U-factor.

R402.1.4 (N1102.1.4) Total UA alternative. If the total *building thermal envelope* UA (sum of *U*-factor times assembly area) is less than or equal to the total UA resulting from using the *U*-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The U-factor contribution of airspaces enclosed within an assembly shall comply with Section R402.1.3.1. The SHGC requirements shall be met in addition to UA compliance.

Add new definition as follows:

IDEAL AIRSPACE. An airspace contained within a cavity of a field-built assembly that, where used to contribute to thermal resistance of the assembly, is bounded on all sides by solid materials with joints and gaps between bounding materials or holes in bounding materials sealed to prevent air movement into or out of the airspace.

Reason: The ASHRAE Handbook of Fundamentals, Chapter 26, Table 3 lists the allowable thermal properties for airspaces in a variety of configurations. Footnote b to this table says in part " … Values apply for ideal conditions (i.e., air spaces of uniform thickness bounded by plane, smooth, parallel surfaces with no air leakage to or from the space)..". This concern is unique to the use of an air-space for thermal resistance for a number of reasons. First, an air-space creates a path of least resistance for any air infiltration and this makes air-space thermal performance particularly susceptible to loss of thermal performance due to air infiltration. The test basis and analytical basis of these airspace thermal values are based on ideal conditions or an "ideal airspace" that, most importantly, allows for no air leakage to or from the airspace. In essence, a field-built air-space is intended to trap air as well as sealed or manufactured mass insulation products that provide at least some resistance to air-movement. Furthermore, air-space thermal performance is dynamic, dependent on both heat flow direction and temperature difference. As such, use of the ASHRAE Fundamentals values for thermal resistance of airspaces requires the user to use boundary conditions similar to those used to establish the thermal values. Alternatively, the performance of non-ideal air spaces which allow some amount of air-leakage into or out of the airspace must have reduced (non-ideal) thermal performance qualified by appropriate testing with representative boundary conditions. Unfortunately, such a standardized test method does not currently exist. Without this proposal to provide clear enforceable language consistent the technical basis of airspace thermal performance, use of air-space thermal properties will continue to be determined based on ideal conditions that are often far from those actually provided in practice, resulting in performance that can be, in worst case, as little as 15% of that claimed based on ideal airspace conditions (refer to independent lab test data reported at http://fsc.americanchemistry.com/Energy-Code/Energy-Code-Compliance.pdf) .

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

C402.1.2.1 (NEW)-EC-CRANDELL.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The committee agrees that better guidance is needed on the description of an airspace that qualifies as contributing to a U-Factor of an assembly. However, there seems to be differences of opinion as to whether the details need to be so restrictive as described for an "ideal airspace" in the proposal. In addition, this information is better placed in a handbook or commentary.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.1.3.1 (N1102.1.3.1) Airspace U-factor. Where used to comply with building thermal envelope requirements, the thermal resistance of an enclosed air space shall be determined in accordance with the ASHRAE *Handbook of Fundamentals* or tested in accordance with Section R303.1.4 for the applicable conditions of use and direction of heat flow. Where the thermal performance of an enclosed air space is determined by use of the ASHRAE *Handbook of Fundamentals*, the enclosed air space construction shall be of uniform thickness bounded by plane, smooth, parallel surfaces. In all cases, enclosed air spaces shall comply with the following:

1. Located to the interior side of a continuous air barrier installed in accordance with Section R402.4.1.
2. Separated from the interior of the building by a continuous, non-air permeable material such as gypsum wall board.
3. Penetrations into or through the enclosed air space shall be sealed.
4. Venting of the enclosed airspace to the interior, exterior, or building cavities shall not be permitted.
5. Reflective surfaces, if used, shall face the enclosed air space and shall be installed in a manner that prevents dust accumulation on the reflective surface during construction and use. In a horizontal enclosed air space, reflective surfaces shall be installed above the enclosed airspace facing downward.

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

ENCLOSED AIR SPACE. An unventilated cavity located to the interior side of a continuous air-barrier and bounded on all sides with building components assembled together in a manner that prevents indoor or exterior air leakage into or from the cavity or between adjacent cavities, including sealing of penetrations.

Commenter's Reason: This proposal follows direction given by the code development committee at the first hearing in agreement that "better guidance is needed on the description of an air space that qualifies as contributing to the U-factor of an assembly."

Air-spaces are a viable means of contributing to compliance with thermal envelope requirements, but lack important and enforceable guidance in the code to ensure appropriate use. The ACC/FSC includes manufacturer members that have products capable of taking advantage of airspace thermal performance. But, the thermal resistance of field-built airspaces are particularly vulnerable to loss of performance if they are not adequately enclosed to prevent air-leakage into or out of the airspace as clearly required in the AHSRAE *Handbook of Fundamentals* and the scientific literature. A review of the scientific literature on this topic was conducted to guide this public comment and will be made available at fsc.americanchemistry.com.

While test methods for all insulation materials are conducted under conditions of no air leakage or pressure differentials that drive air-leakage into, through, and out of building assemblies, airspaces provide no resistance to air movement and they are particularly vulnerable to significant loss of thermal performance when air leakage is not adequately controlled. For example, one test report referenced in the original proposal's reason statement shows that only 15% of the normally claimed thermal performance may be achieved when air-spaces are not adequately enclosed, even when tested under conditions of no pressure differential to drive air movement through an assembly as would be typically experienced in end use due to building ventilation, HVAC pressure imbalances, buoyancy effects of interior air, and wind. In addition, the sensitivity of reflective surfaces (which are required to be used in conjunction with an airspace to provide any thermal value) to dust accumulation and heat flow direction are well-documented in the scientific literature. This proposal is coordinated with various existing provisions in the code to address the above concerns and to provide needed guidance for building officials to knowledgeably enforce and users to properly implement the appropriate use of airspaces for their ability to contribute to the thermal performance of buildings rather than erode the thermal performance intent of the code.

CE84-13, Part II

Final Action: AS AM AMPC____ D

CE85-13
C402.1.2.1 (NEW), Table C402.2.3 (NEW)

Proposed Change as Submitted

Proponent: Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance

Add new text as follows:

C402.1.2.1 Thermal resistance of cold-formed steel walls. U-factors of walls with cold-formed steel studs shall be permitted to be determined in accordance with Equation 4-X:

$U = 1/[R_s + (R_{ins} \times F_c)]$ **Equation 4-x**

Where:

R_s = The cumulative R-value of the wall components along the path of heat transfer, excluding the cavity insulation and steel studs.
R_{ins} = The R-value of the cavity insulation.
F_c = The correction factor from Table 402.2.3

TABLE C402.2.3
F_c VALUES FOR STEEL STUD WALL ASSEMBLIES

Nominal stud depth (inches)	Spacing of framing (inches)	Cavity R-Value	Correction factor (F_c)
3-1/2	16	13	0.46
		15	0.43
3-1/2	24	13	0.55
		15	0.52
6	16	19	0.37
		21	0.35
6	24	19	0.45
		21	0.43
8	16	25	0.31
8	24	25	0.38

Reason: This proposal addresses a gap in the code in regard to calculating U-factors for steel stud wall assemblies. The proposed equation and correction factors are the same as those in the 2003 IECC residential section. They were removed in favor of simplistic prescriptive solutions in the 2004 and later editions. The code has lacked direction in the commercial section for determining U factors of cold-formed steel assemblies. Although the 2003 edition only contained this equation in the residential section, the assumptions underlying the methodology are equally applicable to commercial buildings. The same calculation procedure is recognized in ASHRAE 90.2. It is also the same methodology used by the ASHRAE 90.1 envelope subcommittee in developing the U factor tables in Appendix Table A.3.3 (Assembly U-Factors for Steel-Framed Walls) for non-residential buildings. Inclusion of the equation and correction factors in this section of the IECC will provide users with a calculation method without the need to refer to additional references for U-factors of conventional C-shaped steel stud walls. It will enable calculations with varying levels of cavity and continuous insulation for compliance with the envelope requirements in Section C402.

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

C402.1.2.1 (NEW)-EC-NOWAK.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides a methodology to calculate U-factors not currently in the code for steel frame construction.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.1.2.1 Thermal resistance of cold-formed steel walls. U-factors of walls with cold-formed steel studs shall be permitted to be determined in accordance with Equation 4-X:

$U = 1/[R_s + (\underline{ER})\ \cancel{(R_{ins}\ x\ F_c)}]$ **Equation 4-X**

Where:

R_s = The cumulative R-value of the wall components along the path of heat transfer, excluding the cavity insulation and steel studs.

<u>ER = The effective R-value of the cavity insulation with steel studs</u>

~~R_{ins} = The R-value of the cavity insulation.~~

~~F_c = The correction factor from Table 402.2.3~~

TABLE C402.2.3

~~F_c~~ <u>EFFECTIVE R-</u>VALUES FOR STEEL STUD WALL ASSEMBLIES

Nominal stud depth (inches)	Spacing of framing (inches)	Cavity R-Value <u>(insulation)</u>	Correction factor (F_c)	<u>Effective R-Value (ER) (Cavity R-Value x F_c)</u>
3-1/2	16	13	0.46	<u>5.98</u>
		15	0.43	<u>6.45</u>
3-1/2	24	13	0.55	<u>7.15</u>
		15	0.52	7.80
6	16	19	0.37	<u>7.03</u>
		21	0.35	<u>7.35</u>
6	24	19	0.45	<u>8.55</u>
		21	0.43	<u>9.03</u>
8	16	25	0.31	<u>7.75</u>
	24	25	0.38	<u>9.50</u>

Commenter's Reason: We support the concept of this code change. However, it will be clearer and more effective if a new "effective R-Value" column is added to the table, so that applicants and code officials are not required to do the arithmetic each time they use the table. They will be able to see the effective R-value of insulated metal stud walls at a glance. This will reduce calculation errors and save time for everyone.

CE85-13

Final Action: AS AM AMPC____ D

CE86-13
C402.1, C402.1.3 (NEW)

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

C402.1.3 Total UA alternative. Proposed buildings with a total building UA equal or less than the code-target total building UA shall be considered in compliance with Section C402.1. The UA for each assembly is the area or perimeter of that assembly times the applicable U-factor, C-factor or F-factor for that assembly. The building total UA is the sum of UAs for the assemblies. The area or perimeter for each assembly shall be as proposed. The code-target U-factor, C-factor or F-factor shall be the applicable value from Tables C402.1.2 and C402.3. The proposed building U-factor, C-factor or F-factor shall be that of the proposed assembly.

The code-target *U*-factors for skylight areas greater than 3 percent of the roof and above-grade wall fenestration areas greater than 30 percent shall be the U-factors of the surrounding opaque assembly.

C402.3.4 Area-weighted SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Reason: The commercial IECC does not specifically allow a UA tradeoff. This UA tradeoff similar to the residential UA tradeoff in Section R402.1.4 in the residential IECC. This change explicitly allows an area-weighted average of fenestration SHGC as is currently allowing for residential in Section R402.3.2.

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

C402.1-EC-CONNER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Committee expressed early preferences for either CE87-13 or CE88-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self, requests Approval as Submitted.

Commenter's Reason: The three submitting options for a UA calculation in commercial (CE86, CE87, CE88) agreed that something needed to be done. We also agreed that any of them was probably better than the existing code. Somehow we managed to get them all disapproved. Although we have favorites, I'd suggest the approval of the option that seems the clearest. Personally I like brevity so proposed this.

CE86-13

Final Action: AS AM AMPC____ D

CE88-13
C402.1, C402.1.3 (NEW)

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 <u>or Section C402.1.3</u> shall be permitted as an alternative to the R-values specified in Section C402.1.1.

<u>**C402.1.3 Component performance alternative.** Building envelope values and fenestration areas determined in accordance with Equation 4-3 shall be permitted in lieu of compliance with the U-factors, F-factors and C-factors in Tables C402.1.2 and C402.3 and the maximum allowable fenestration areas in Section C402.3.1.</u>

<u>(UA Sum) + (FL Sum) + (CA Sum) + (XVG) + (XSky) $\leq$ Zero.</u> **<u>(Equation 4-3)</u>**

<u>Where:</u>

<u>UA Sum = Sum of the (UA Dif) values for each assembly that comprises a portion of the building thermal envelope.</u>
<u>UA Dif = (UA Proposed) – (UA Table).</u>
<u>UA Table = (Maximum allowable U-factor specified in Table C402.1.2 or Table C402.3) x (Area).</u>
<u>UA Proposed = (Proposed U-value) x (Area).</u>

<u>FL Sum = Sum of the (FL Dif) values for each slab on grade assembly that comprises a portion of the building thermal envelope.</u>
<u>FL Dif = (FL Proposed) – (FL Table).</u>
<u>FL Table = (Maximum allowable F-factor specified in Table C402.1.2) x (Perimeter length).</u>
<u>FL Proposed = (Proposed F-value) x (Perimeter length) .</u>

<u>CA Sum = Sum of the (CA Dif) values for each below-grade wall assembly that comprises a portion of the building thermal envelope.</u>
<u>CA Dif = (CA Proposed) – (CA Table).</u>
<u>CA Table = (Maximum allowable C-factor specified in Table C402.1.2) x (area).</u>
<u>CA Proposed = (Proposed C-value) x (area).</u>

<u>XVG (Excess Vertical Glazing Value) = (XVGArea x UVG) – (XVGArea x UWall), but not less than zero.</u>
<u>XVGArea (Excess Vertical Glazing Area) = (Proposed Vertical Glazing Area) – (Allowable Vertical Glazing Area deterimined in accordance with Section C402.3.1).</u>
<u>UA Wall = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of the exterior wall.</u>
<u>UWall = UA Wall / total opaque exterior wall area.</u>
<u>UA VG = Sum of the (UA Proposed) values for each vertical glazing assembly.</u>
<u>UVG = UA VG / total vertical glazing area.</u>

<u>XSky (Excess Skylight Value) = (XSArea X USky) – (XSArea x U Roof), but not less than zero.</u>
<u>XSArea (Excess Skylight Area) = (Proposed Skylight Area) – (Allowable Skylight Area determined in accordance with Section C402.3.1).</u>
<u>UA Roof = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of a roof.</u>

URoof = UA Roof / total opaque roof area.
UA Sky = Sum of the (UA Proposed) values for each skylight assembly.
USky = UA Sky / total skylight area.

Reason: This proposal provides an Alternative component performance path for commercial buildings parallel to the "Total UA Alternative" for residential buildings in Section R402.1.4, but accounting for slab edge F-factors, basement wall C-Factors, and fenestration areas in excess of the code limits.

This optional path provides significant additional flexibility for design teams, allowing them to trade off the U values of various building envelope components, without having to do a full Total Building Performance computation. The calculation can be done by an architect or engineer using a simple calculator. It is variation of a widely-used method in the Washington State code, and results in lower overall costs and more design freedom without any sacrifice of energy conservation.

The formula allows various envelope components to be traded off against each other, provided that the overall calculated building heat loss of the proposed design is no greater than a code-compliant design. Thus, greater window area might be acceptable with lower window U-values, or wall insulation might be reduced in certain areas while roof insulation is increased.

The five principal factors in the equation are:

- (UA Sum) The sum of the U-value for each envelope assembly times its area.
- (FL Sum) The sum of the F-value for each slab edge assembly times its length.
- (CA Sum) The sum of the C-value for each basement wall assembly times its area.
- (XSky) Additional amount for skylight area in excess of code maximum – Substitutes the average roof U-value for the average skylight U-value in the base case for the excess skylight area.
- (XVG) Additional amount for vertical glazing area in excess of maximum – Substitutes the average wall U-value for the average vertical glazing U-value in the base case for the excess vertical glazing area

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

C402.1.3 (NEW)-EC-KRANZ.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Three proposals (CE86 through CE88-13) proposed different ways to allow a UA tradeoff approach. The committee felt that the formula may be too complicated for those without engineering background to be able to enforce. There was concern that not all elements of the design are properly captured.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the R-values specified in Section C402.1.1.

C402.1.3 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-3 shall be permitted in lieu of compliance with the U-factors, F-factors and C-factors in Tables C402.1.2 and C402.3 and the maximum allowable fenestration areas in Section C402.3.1.

A + B + C + D + E ≤ Zero **(Equation 4-3)**

Where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls
UA Dif = UA Proposed – UA Table
UA Proposed = Proposed U-value x Area
UA Table = (U-factor from Table C402.1.2 or Table C402.3) x Area

B = Sum of the (FL Dif) values for each distinct slab on grade perimeter condition of the building thermal envelope
FL Dif = FL Proposed – FL Table
FL Proposed = Proposed F-value x Perimeter length
FL Table = (F-factor specified in Table C402.1.2) x Perimeter length

C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope
CA Dif = CA Proposed – CA Table
CA Proposed = Proposed C-value x Area
CA Table = (Maximum allowable C-factor specified in Table C402.1.2) x Area

Where the proposed vertical glazing area is less than or equal to the maximum vertical glazing area allowed by Section C402.3.1, the value of D (Excess Vertical Glazing Value) shall be zero. Otherwise:
D = (DA x UVG) – (DA x UWall), but not less than zero.
DA = (Proposed Vertical Glazing Area) – (Vertical Glazing Area allowed by Section C402.3.1)
UA Wall = Sum of the (UA Proposed) values for each opaque assembly of the exterior wall
UWall = Area-weighted average U-value of all above-grade wall assemblies
UAV = Sum of the (UA Proposed) values for each vertical glazing assembly
UV = UAV / total vertical glazing area

Where the proposed skylight area is less than or equal to the skylight area allowed by Section C402.3.1, the value of E (Excess Skylight Value) shall be zero. Otherwise:
E = (EA X US) – (EA x URoof), but not less than zero.
EA = (Proposed Skylight Area) – (Allowable Skylight Area from Section C402.3.1)
URoof = Area-weighted average U-value of all roof assemblies
UAS = Sum of the (UA Proposed) values for each skylight assembly
US = UAS / total skylight area

Commenter's Reason: Please see the example calculation at the end of this comment. This formula was revised and simplified in response to Committee and membership concerns that it appeared too complex.
The component performance path is clearly valuable for commercial buildings. The evidence is straightforward: in Washington State, where a similar UxA calculation has been available for decades, almost every commercial project in the state makes use of it. It allows envelope heat loss to be calculated using a simple spreadsheet (see attached for example) instead of using either COMcheck or a full-blown Total Building Performance analysis. It provides design flexibility and cost savings while maintaining the same limits on heat loss. It provides a compliance path that does not depend on continued DOE funding for COMcheck.
This proposal provides a component performance path for commercial buildings similar to the "Total UA Alternative" for residential buildings in Section R402.1.4, but accounting for slab edge F-factors, basement wall C-Factors, and fenestration areas in excess of the code limits.

Component Performance								
	Example building: 2-story building with 10,000 SF each floor, 10,000 SF exterior wall area, 5,000 SF floor over parking, no basement walls, and 40% vertical glazing (instead of code max 30%). In this case, the extra glazing area is accommodated in the design by use of a triple-glazed curtain wall.							
	Formula: (A + B + C + D + E ≤ Zero)							
		Area	Proposed U-value	Proposed UA (U xArea)	Table U-factor	Table UA (U x Area)	UA Dif (Proposed UA - Table UA)	**Totals**
	roof - insul above deck	10000	0.03	300	0.034	340	-40	
	wall 1 - mass wall	6000	0.09	540	0.078	468	72	
	wall 2 - steel stud	4000	0.055	220	0.055	220	0	
	floor - framed	5000	0.029	145	0.029	145	0	
	skylight	100	0.5	50	0.5	50	0	
	VG 1 - alum curtain wall	3000	0.22	660	0.38	1140	-480	
	VG 2 - wood framed	1000	0.3	300	0.3	300	0	
A	**Sum of the (UA Dif) values for envelope assemblies**						-448	**-448**

		Length of slab edge	Proposed F-value	Proposed FxLength	Table F-factor	Table FxLength	FL Dif	
	slab edge - perimeter	200	0.54	108	0.528	105.6	2.4	
	slab edge - at garage	100	0.62	62	0.528	52.8	9.2	
B	**Sum of the (FL Dif) values for both slab-on-grade perimeter conditions**						11.6	**11.6**
C	**(no basement walls in this design)**							**0**
	Uwall	0.076	= Area-weighted avg U-value of above-grade wall assemblies					
	UAV	960	= Sum of the (UA Proposed) values for each vertical glazing assembly					
	UV	0.24	= UAV / total vertical glazing area					
	DA	1000	= (Proposed VG Area) – (VG Area allowed by Section C402.3.1)					
	VGA	4000	= Proposed Vertical Glazing Area					
	Allow VG Area	3000	= 30% max from Section C402.3.1					
	Wall Area	10000	= Gross wall area					
	UA Wall	760	= Uwall x Wall Area)					
D	**Excess vert glazing area**	**164**	(DA x UVG) – (DA x UWall) - Zero if ≤ zero					**164**
E	**Excess skylight area**	(Proposed skylight area is less than allowable area, so value is zero)						**0**
Component Performance: (A + B + C + D + E) - OK since less than zero.								**-272**

CE88-13

Final Action: AS AM AMPC____ D

CE89-13
Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.039~~ 0.032	U-~~0.039~~ 0.032	U-~~0.039~~ 0.032	U-~~0.039~~ 0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-~~0.044~~ 0.041	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-~~0.031~~ 0.029	U-0.029	U-0.029	U-~~0.029~~ 0.026	U-~~0.029~~ 0.026
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-~~0.027~~ 0.021	U-~~0.027~~ 0.021	U-~~0.027~~ 0.021	U-0.021	U-0.021	U-0.021	U-~~0.021~~ 0.017	U-~~0.021~~ 0.017	U-~~0.021~~ 0.017	U-~~0.021~~ 0.017
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-~~0.061~~ 0.048	U-~~0.061~~ 0.048
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-~~0.052~~ 0.050	U-~~0.052~~ 0.050	U-~~0.052~~ 0.050	U-~~0.052~~ 0.050	U-~~0.052~~ 0.050	U-~~0.052~~ 0.044	U-0.039	U-~~0.052~~ 0.039	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-~~0.064~~ 0.055	U-~~0.064~~ 0.055	U-~~0.064~~ 0.049	U-~~0.057~~ 0.049	U-~~0.064~~ 0.049	U-~~0.052~~ 0.042	U-~~0.045~~ 0.037	U-~~0.045~~ 0.037
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-~~0.064~~ 0.051	U-~~0.064~~ 0.051	U-0.051	U-0.051	U-0.051	U-0.051	U-~~0.036~~ 0.032	U-~~0.036~~ 0.032
Walls, Below Grade																
Below-grade wall	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-~~0.119~~ 0.092	C-0.119	C-~~0.119~~ 0.092	C-~~0.119~~ 0.092	C-~~0.119~~ 0.063	C-~~0.092~~ 0.063	C-~~0.092~~ 0.063	C-~~0.092~~ 0.063	C-~~0.092~~ 0.063
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-~~0.076~~ 0.057	U-~~0.074~~ 0.051	U-~~0.074~~ 0.057	U-~~0.064~~ 0.051	U-~~0.064~~ 0.051	U-~~0.057~~ 0.051	U-~~0.055~~ 0.042	U-~~0.051~~ 0.042	U-~~0.055~~ 0.038	U-~~0.051~~ 0.038

Climate Zone	1		2		3		4		5		6		7		8	
Joist/framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-~~0.73~~ 0.54	F-~~0.54~~ 0.52	F-~~0.54~~ 0.52	F-~~0.54~~ 0.52	F-~~0.54~~ 0 .51	F-~~0.54~~ 0.51	F-~~0.52~~ 0.434	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-~~0.55~~ 0.373

(*Footnotes not shown remain unchanged.*)

Table C402.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-30ci	R-30ci	R-~~30~~ 35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocks)	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-25+ R-11 LS	R-~~25~~30+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS	R-~~30~~ 25+ R-11+ R-11 LS	R-~~30~~ 25+ R-11+ R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-~~38~~ 49	R-~~38~~ 49	R-~~38~~ 49	R-49	R-49	R-49	R-~~49~~ 60	R-~~49~~60	R-~~49~~ 60	R-~~49~~ 60
Walls, Above Grade																
Mass	R-5.7ci	R-5.7ci	R-5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal Building	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-~~13~~ 19ci	R-13 + R-~~13~~ 19ci	R-13 + R-~~13~~ 19ci	R-13 + R-~~13~~ 19ci	R-13 + R-~~13~~ 19ci	R-13 + R-~~13~~ 22.1ci	R-13 + R19.5ci	R-13 + R-~~13~~ 25ci	R-13 + R-~~19.5~~ 25ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + 7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-~~7.5~~ 10ci	R-13 + R-~~7.5~~ 10ci	R-13 + R-~~7.5~~ 12.5ci	R-13 + R-~~7.5~~ 12.5ci	R-13 + R-~~7.5~~ 12.5ci	R-13 + R-15.6ci	R-13 + R-~~7.5~~ 18.8ci	R-13 + R-~~17.5~~ 18.8ci
Wood framed & other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-~~3.8~~ 7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-~~3.8~~ 5ci	R-13 + R-7.5ci or R-20 + R-~~3.8~~ 5ci	R-13 + R-7.5ci or R-20 + R-~~3.8~~ 5ci	R-13 + R-7.5ci or R-20 + R-~~3.8~~ 5ci	R-13 + R-7.5ci or R-20 + R-~~3.8~~ 5ci	R-13 + R-~~15.6~~ 18.8ci ~~or R-20 + R-10 ci~~	R-13 + R-~~15.6~~ 18.8ci ~~or R-20 + R-10 ci~~
Walls, Below Grade																
Below-grade wall	NR	NR	NR	NR	NR	NR	R-7.5ci	R-~~7.5~~ 10ci	R-7.5ci	R-~~7.5~~ 10ci	R-~~7.5~~ 10ci	R-~~7.5~~ 15ci	R-~~10~~ 15ci	R-~~10~~ 15ci	R-~~10~~ 15ci	R-~~12.5~~ 15ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-~~10~~ 14.6ci	R-~~10.4~~ 16.7ci	R-~~10~~ 14.6ci	R-~~12.5~~ 16.7ci	R-~~12.5~~ 16.7ci	R-~~12.5~~ 16.7ci	R-~~15~~ 20.9ci	R-~~16.7~~ 20.9ci	R-~~15~~ 23ci	R-~~16.7~~ 23ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-~~30~~ 38	R-~~30~~ 38	R-~~30~~ 38	R-~~30~~ 38	R-~~30~~ 38	R-~~30~~ 38
Slab-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	~~NR~~ R-10 for 24"	R-~~10~~15 for 24" below	R-~~10~~15 for 24" below	R-~~10~~15 for 24" below	R-~~10~~ 20 for 24" below	R-~~10~~20 for 24" below	R-~~15~~20 for ~~24"~~48"	R-~~15~~ 20 for 24" below	R-~~15~~20 for ~~24"~~48"	R-~~15~~20 for ~~24"~~48"	R-~~20~~25 for ~~24"~~48"

Climate Zone	1		2		3		4		5		6		7		8	
						below						below		below	below	below
Heated slabs	R-7.5 for 12" below	R-7.5 for 12" below	R-~~7.5~~ 10 for ~~12"~~24" below	R-~~7.5~~15 for ~~12"~~24" below	R-~~10~~15 for 24" below	R-~~10~~15 for 24" below	R-~~15~~20 for 24" below	R-~~15~~20 for ~~24"~~48" below	R-~~15~~20 for ~~36"~~48" below	R-~~15~~20 for ~~36"~~48" below	R-~~15~~20 for ~~36"~~48" below	R-~~20~~ 25 for 48" below	R-~~20~~25 for ~~24"~~48" below	R-~~20~~25 for 48" below	R-~~20~~25 for 48" below	R-20 ~~for 48" below~~ full slab

(*Footnotes not shown remain unchanged.*)

Reason: The purpose of this proposed code change is to update and increase the stringency of the opaque thermal envelope insulation tables in the *IECC* based on the values in *ANSI/ASHRAE/IES Addendum bb to ANSI/ASHRAE/IES Standard 90.1-2010* (approved in 2012). Specifically, where *IECC* values remain more stringent and energy efficient, the proposal retains the *IECC* values. Where the *ASHRAE* values are more stringent and energy efficient, those values have replaced the current *IECC* values. Since *ASHRAE 90.1* and the *IECC* use similar approaches to opaque envelope criteria, *ASHRAE 90.1* is an option for compliance under the *IECC*, and *ASHRAE 90.1* is the federal baseline commercial energy code standard, it is reasonable at this time to update *IECC* values to reflect improved *ASHRAE* values in the absence of a separate comprehensive analysis of opaque envelope values. However, where the *IECC* remains more stringent, *IECC* values should be retained to avoid backsliding and reductions in energy efficiency, in order to keep the *IECC* a premier commercial energy code.

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

C402.1.2T-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Three proposals (CE86 through CE88-13) proposed different ways to allow a UA tradeoff approach. The committee felt that the formula may be too complicated for those without engineering background to be able to enforce. There was concern that not all elements of the design are properly captured.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
									Roofs							
Insulation entirely above deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-~~0.041~~ 0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.029	U-0.029	U-0.029	U-0.026	U-0.026
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.017	U-0.017	U-0.017	U-0.017
									Walls, Above Grade							
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-~~0.078~~ 0.090	U-0.078	U-0.078	U-~~0.071~~ 0.061	U-0.061	U-0.061	U-0.048	U-0.048
Metal building	U-0.079	U-0.079	U-0.079	U-~~0.079~~ 0.052	U-0.079	U-0.052	U-0.052	U-0.050	U-0.050	U-0.050	U-0.050	U-0.050	U-0.044	U-0.039	U-0.039	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.055	U-0.055	U-0.049	U-0.049	U-0.049	U-0.042	U-0.037	U-0.037
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.051	U-0.051	U-0.032	U-0.032
									Walls, Below Grade							
Below-grade wall	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.092	C-0.119	C-0.092	C-0.092	C-0.063	C-0.063	C-0.063	C-0.063	C-0.063
									Floors							
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.057	U-0.051	U-0.057	U-0.051	U-0.051	U-0.051	U-0.042	U-0.042	U-0.038	U-0.038
Joist/framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
									Slab-on-Grade Floors							

Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.52	F-0.52	F-0.52	F-~~0.51~~ 0.505	F-~~0.51~~ 0.505	F-0.434	F-~~0.40~~ 0.505	F-~~0.40~~ 0.434	F-~~0.40~~ 0.434	F-~~0.40~~ 0.424
Heated slabs	F-~~0.70~~ 1.020	F-~~0.70~~ 1.020	F-~~0.70~~ 0.900	F-~~0.70~~ 0.860	F-~~0.70~~ 0.860	F-~~0.70~~ 0.860	F-~~0.65~~ 0.843	F-~~0.65~~ 0.688	F-~~0.58~~ 0.688	F-~~0.58~~ 0.688	F-~~0.58~~ 0.688	F-~~0.58~~ 0.671	F-~~0.55~~ 0.671	F-~~0.55~~ 0.671	F-~~0.55~~ 0.671	F-0.373

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
Roofs																
Insulation entirely above deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocks)	R-19+R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-25+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS	R-25+R-11+ R-11 LS	R-25+R-11+ R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-60	R-60	R-60	R-60
Walls, Above Grade																
Mass	R-5.7ci	R-5.7ci	R-5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal Building	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-~~13~~0 + R-19ci	R-~~13~~0 + R-19ci	R-~~13~~0 + R-19ci	R-~~13~~0 + R-19ci	R-~~13~~0 + R-19ci	R-~~13~~0 + R-22.1ci	R-~~13~~0 + R~~19.5ci~~ R-25ci	R-~~13~~0 + R-25ci	R-~~13~~0 + R-25ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-10ci	R-13 + R-10ci	R-13 + R-12.5ci	R-13 + R-12.5ci	R-13 + R-12.5ci	R-13 + R-15.6ci	R-13 + R-18.8ci	R-13 + R-18.8ci
Wood framed & other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-5ci	R-13 + R-18.8ci	R-13 + R-18.8ci
Walls, Below Grade																
Below-grade wall	NR	NR	NR	NR	NR	NR	R-7.5ci	R-10ci	R-7.5ci	R-10ci	R-10ci	R-15ci	R-15ci	R-15ci	R-15ci	R-15ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-14.6ci	R-16.7ci	R-14.6ci	R-16.7ci	R-16.7ci	R-16.7ci	R-20.9ci	R-20.9ci	R-23ci	R-23ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-38	R-38	R-38	R-38	R-38	R-38
Slab-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-20 for 24" below	R-20 for 24" below	R-20 for 48" below	R-20 for 24" below	R-20 for 48" below	R-20 for 48" below	R-25 for 48" below
Heated slabs	R-7.5 for 12" below	R-7.5 for 12" below	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-20 for 24" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below	R-20 for 48" below	R-25 for 48" below	R-25 for 48" below	R-25 for 48" below	R-25 for 48" below	R-20-full slab

(Portions of Table not shown remain unchanged)

Commenter's Reason: We recommend approval of CE89, as modified. CE89 will ensure that the opaque envelope table of the IECC is no less efficient in all categories than the current ASHRAE 90.1 addendum bb, while retaining increased efficiency already included in the IECC.

It is important to continue to improve the IECC commercial opaque building envelope; while there were some improvements made in 2012, much was left on the table. CE89 incorporates the progress made by ASHRAE in improving opaque envelope energy efficiency through ASHRAE 90.1 addendum bb, without weakening the current 2012 IECC requirements in cases where they are already more efficient. Since ASHRAE developed addendum bb through a consensus process with technical and cost effectiveness analysis, it is reasonable to adopt these values into the IECC, where the IECC is weaker. Similarly, where current values in the IECC are already more efficient, it is reasonable not to change the values already vetted in previous code cycles and contained in the code. As a result, rather than adopt addendum bb values across the board (some of which are weaker than the 2012 IECC requirements), CE89 takes the most efficient values of both tables. While we could have developed our own improved values, we thought it would reduce controversy and ease approval if we simply used ASHRAE values where they were better.

The committee claimed in its reason for not supporting this proposal that "the metrics used to determine the values in the table were not consistently applied, therefore there were errors." In response to this criticism, this public comment revises the values that were identified as "incorrect" during the debate or upon further review.

The table modifications in this public comment include (1) four U-factor changes that were originally internally inconsistent in the 2012 IECC and were originally not changed in the CE89 proposal, (2) twenty-one F-factor changes that were incorrectly included in the 2012 IECC, were inconsistent with ASHRAE 90.1 table A6.3 and were not changed in the CE89 proposal, (3) eight R-Values that originally were not changed in the CE89 proposal from R-13 cavity insulation to R-0 to be consistent with ASHRAE 90.1 addendum bb and (4) the R-Value edit in climate zone 7 to have the consistent continuous insulation values for the 0.039 U-factor already included the CE89 proposal.

The values proposed in CE89 have already been thoroughly vetted and approved through the ICC or ASHRAE process – and in many cases – both. These are not new calculations and are not biased toward weakening the IECC. As a result, there is no need to further address the specific individual values that appear in this table. This is not a case of "cherry picking" values (as opponents suggested at the committee hearing). These are simply the most efficient values justified by the ICC and/or ASHRAE code development processes.

CE89-13

Final Action: AS AM AMPC____

CE90-13
Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

TABLE C402.1.2 OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 ~~EXCEPT MARINE~~		5 ~~AND MARINE 4~~		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.048~~ 0.039	U-~~0.039~~ 0.032	U-~~0.039~~ 0.032	U-~~0.039~~ 0.032	U-~~0.039~~ 0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-~~0.044~~ 0.041	U-~~0.035~~ 0.041	U-~~0.035~~ 0.041	U-~~0.035~~ 0.041	U-~~0.035~~ 0.041	U-~~0.035~~ 0.041	U-~~0.035~~ 0.037	U-~~0.035~~ 0.037	U-~~0.035~~ 0.037	U-~~0.035~~ 0.037	U-0.031	U-~~0.031~~ 0.029	U-0.029	U-0.029	U-~~0.029~~ 0.026	U-~~0.029~~ 0.026
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-~~0.027~~ 0.021	U-~~0.027~~ 0.021	U-~~0.027~~ 0.021	U-~~0.027~~ 0.021	U-0.021	U-0.021	U-~~0.021~~ 0.017	U-~~0.021~~ 0.017	U-~~0.021~~ 0.017	U-~~0.021~~ 0.017
Walls, Above Grade																
Mass	U-~~0.142~~ 0.580	U-~~0.142~~ 0.151[c]	U-~~0.142~~ 0.151[c]	U-0.123	U-~~0.110~~ 0.123	U-0.104	U-0.104	U-0.090	U-~~0.078~~ 0.090	U-~~0.078~~ 0.080	U-~~0.078~~ 0.080	U-0.071	U-~~0.061~~ 0.071	U-~~0.061~~ 0.071	U-~~0.061~~ 0.048	U-~~0.061~~ 0.048
Metal building	U-~~0.079~~ 0.094	U-~~0.079~~ 0.094	U-~~0.079~~ 0.094	U-~~0.079~~ 0.094	U-~~0.079~~ 0.094	U-~~0.052~~ 0.071	U-~~0.052~~ 0.060	U-~~0.052~~ 0.050	U-~~0.052~~ 0.050	U-~~0. 052~~ 0.050	U-~~0. 052~~ 0.050	U-~~0. 052~~ 0.050	U-~~0.052~~ 0.044	U-~~0.039~~ 0.044	U-~~0.052~~ 0.039	U-0.039
Metal framed	U-~~0.077~~ 0.124	U-~~0.077~~ 0.124	U-~~0.077~~ 0.084	U-0.064	U-0.~~064~~ 077	U-0.064	U-0.064	U-0.064	U-~~0.064~~ 0.055	U-~~0.064~~ 0.055	U-~~0.064~~ 0.049	U-~~0.057~~ 0.049	U-~~0.064~~ 0.049	U-~~0.052~~ 0.042	U-~~0.045~~ 0.037	U-~~0.045~~ 0.037
Wood framed and other	U-~~0.064~~ 0.089	U-~~0.064~~ 0.089	U-~~0.064~~ 0.089	U-~~0.064~~ 0.089	U-~~0.064~~ 0.089	U-0.064	U-0.064	U-0.064	U-~~0.064~~ 0.051	U-~~0.064~~ 0.051	U-0.051	U-0.051	U-0.051	U-0.051	U-~~0.036~~ 0.032	U-~~0.036~~ 0.032
Walls, Below Grade																
Below-grade wall[b]	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-~~0.119~~ 0.092	C-0.119	C-~~0.119~~ 0.092	C-~~0.119~~ 0.092	C-~~0.19~~ 0.063	C-~~0.092~~ 0.063	C-~~0.092~~ 0.063	C-~~0.092~~ 0.063	C-~~0.092~~ 0.063
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.07~~6~~4	U-0.07~~6~~4	U-~~0.076~~ 0.057	U-~~0.074~~ 0.051	U-~~0.074~~ 0.057	U-~~0.064~~ 0.051	U-~~0.064~~ 0.051	U-~~0.057~~ 0.051	U-~~0.055~~ 0.042	U-~~0.051~~ 0.042	U-~~0.055~~ 0.038	U-~~0.051~~ 0.038

CLIMATE ZONE	1		2		3		4 ~~EXCEPT MARINE~~		5 ~~AND MARINE 4~~		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Metal Joist/framing	U-~~0.066~~ 0.350	U-~~0.066~~ 0.350	U-~~0.033~~ 0.038	U-~~0.033~~ 0.038	U-~~0.033~~ 0.038	U-~~0.033~~ 0.032	U-~~0.033~~ 0.038	U-~~0.033~~ 0.038	U-~~0.033~~ 0.038	U-~~0.033~~ 0.038	U-~~0.033~~ 0.032	U-~~0.033~~ 0.032	U-~~0.033~~ 0.032	U-~~0.033~~ 0.032	U-~~0.033~~ 0.032	U-~~0.033~~ 0.032
Wood Framed and Other	U-0.282	U-0.282	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.~~73~~54	F-~~0.54~~ 0.52	F-~~0.54~~ 0.52	F-~~0.54~~ 0. 520	F-~~0.54~~ 0.510	F-~~0.54~~ 0.510	F-~~0.52~~ 0.434	F-~~0.40~~ 0.510	F-~~0.40~~ 0.434	F-~~0.40~~ 0.434	F-~~0.40~~ 0.424
Heated slabs	F-~~0.70~~ 1.020	F-~~0.70~~ 1.020	F-~~0.70~~ 0.900	F-~~0.70~~ 0.860	F-~~0.70~~ 0.860	F-~~0.70~~ 0.860	F-~~0.65~~ 0.843	F-~~0.65~~ 0.688	F-~~0.58~~ 0.688	F-~~0.58~~ 0.688	F-~~0.58~~ 0.688	F-~~0.58~~ 0.671	F-~~0.55~~ 0.671	F-~~0.55~~ 0.671	F-~~0.55~~ 0.671	F-~~0.55~~ 0.373

a. Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ANSI/ASHRAE/IES~~NA~~ 90.1 Appendix A shall be permitted, provided the construction complies with the applicable construction details from ANSI/ASHRAE/IES~~NA~~ 90.1 Appendix A.

b. Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f °F.

TABLE C402.2 OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 ~~EXCEPT MARINE~~		5 ~~AND MARINE 4~~		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	~~R-20ci~~ R-25ci	~~R-20ci~~ R-25ci	~~R-20ci~~ R-25ci	~~R-20ci~~ R-25ci	~~R-20ci~~ R-25ci	~~R-25ci~~ R-30ci	~~R-25ci~~ R-30ci	~~R-25ci~~ R-30ci	~~R-25ci~~ R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with ~~R-5~~ thermal blocks)[a, b]	~~R-19 +~~ ~~R-11 LS~~ R-10 + R-19 FC	~~R-19 +~~ ~~R-11 LS~~ R-10 + R-19 FC	~~R-19 +~~ ~~R-11 LS~~ R-10 + R-19 FC	~~R-19 +~~ ~~R-11 LS~~ R-10 + R-19 FC	~~R-19 +~~ ~~R-11 LS~~ R-10 + R-19 FC	~~R-19 +~~ ~~R-11 LS~~ R-10 + R-19 FC	R-19 + R-11 LS or R-25 + R-8 LS	R-19 + R-11 LS or R-25 + R-8 LS	R-19 + R-11 LS or R-25 + R-8 LS	R-19 + R-11 LS or R-25 + R-8 LS	R-25 + R-11 LS	~~R-25ci~~ R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS + R-11 LS	R-30 + R-11 LS + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	~~R-38~~ R-49	~~R-38~~ R-49	~~R-38~~ R-49	R-49	R-49	R-49	~~R-49~~ R-60	~~R-49~~ R-60	~~R-49~~ R-60	~~R-49~~ R-60
Walls, Above Grade																
Mass	~~R-5.7ci~~ NR	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-~~25~~ 19ci	R-~~25~~ 19ci
Metal building	~~R-13+~~ ~~R-6.5ci~~ R-0 +	~~R-13+~~ ~~R-6.5ci~~ R-0 +	~~R-13+~~ ~~R-6.5ci~~ R-0 +	~~R-13+~~ ~~R-6.5ci~~ R-0 +	~~R-13+~~ ~~R-6.5ci~~ R-0 +	~~R-13+~~ ~~R-6.5ci~~ R-0 +	~~R-13 +~~ ~~R-13ci~~ R-0 +	~~R-13 +~~ ~~R-13ci~~ R-0 +	~~R-13 +~~ ~~R-13ci~~ R-0 +	~~R-13 +~~ ~~R-13ci~~ R-0 +	~~R-13 +~~ ~~R-13ci~~ R-0 +	~~R-13 +~~ ~~R-13ci~~ R-0 +	~~R-13 +~~ ~~R-13c~~ R-0 +	~~R-13+~~ ~~R-19.5ci~~ R-0 +	R-~~13~~0+ R- ~~19.5ci~~25 ci	R-~~13~~0+ R- ~~19.5ci~~25 ci

CLIMATE ZONE	1		2		3		4 ~~EXCEPT MARINE~~		5 ~~AND MARINE 4~~		6		7		8	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
	R-9.8 c.i.	R-9.8 c.i	R-9.8 ci	R-9.8 ci	R-9.8 ci	R-13 ci	R-15.8 ci	R-19 ci	R-19 ci	R-19 ci	R-19 ci	R-19 ci	R-22.1 ci	R-22.1 ci		
Metal framed	R-13 ~~+~~ ~~R-5ci~~	R-13 ~~+~~ ~~R-5ci~~	R-13 + R-~~5~~3.8ci	R-13 + R-7.5ci	R-13 + R-~~7.5~~ 5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + ~~R-7.5ci~~ R-10ci	R-13 + ~~R-7.5ci~~ R-10ci	R-13 + R-~~7.5ci~~12.5 ci	R-13 + R-~~7.5ci~~12.5 ci	R-13 + R-~~7.5ci~~12.5 ci	R-13 + R-15.6ci	R-13 + ~~R-7.5ci~~ R-18.8ci	R-13+ ~~R17.5ci~~ R-18.8ci
Wood framed and other	R-13 ~~R-3.8ci or R-20~~	R-13 ~~R-3.8ci or R-20~~	R-13 ~~R-3.8ci or R-20~~	R-13 ~~R-3.8ci or R-20~~	R-13 ~~R-3.8ci or R-20~~	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci ~~R-3.8ci~~ or ~~R-20u~~ R-19 + R-5ci	R-13 + R-7.5ci ~~R-3.8ci~~ or ~~R-20u~~ R-19 + R-5ci	R-13 + R-7.5ci or ~~R-20 +~~ ~~R-3.8ci~~ R-19 + R-5ci	R-13 + R-7.5ci or ~~R-20 +~~ ~~R-3.8ci~~ R-19 + R-5ci	R-13 + R-7.5ci or ~~R-20 +~~ ~~R-3.8ci~~ R-19 + R-5ci	R-13 + R-7.5ci or ~~R-20 +~~ ~~R-3.8ci~~ R-19 + R-5ci	R-13 + R-~~15.6ci~~ 18.8ci ~~or R-20 + R-10ci~~	R-13 + R-~~15.6ci~~ 18.8ci ~~or R-20 + R-10ci~~
Walls, Below Grade																
Below-grade wall	NR	NR	NR	NR	NR	NR	R-7.5ci	~~R-7.5ci~~ R-10ci	R-7.5ci	~~R-7.5ci~~ R-10ci	~~R-7.5ci~~ R-10ci	~~R-7.5ci~~ R-15ci	~~R-10cii~~ R-15ci	~~R-10ci~~ ~~i~~R-15ci	~~R-10cii~~ R-15ci	~~R-12.5cii~~ R-15ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	~~R-10ci~~ R-14.6ci	~~R-10ci~~ R-16.7ci	~~R-10ci~~ R-14.6ci	~~R-10ci~~ R-16.7ci	~~R-12.5ci~~ R-16.7ci	~~R-12.5c~~ R-16.7ci	~~R-15cii~~ R-20.9ci	~~R-16.7cii~~ R-20.9ci	~~R-15ci~~ R-23ci	~~R-16.7ci~~ R-23ci
Metal Joist/framing	NR	NR	R-30	R-30	R-30	R-~~30~~ R-38	R-30	R-30	R-30	R-30	~~R-30~~ R-38	~~R-30~~[e] R-38	~~R-30~~[e] R-38	~~R-30~~[e] R-38	~~R-30~~[e] R-38	~~R-30~~[e] R-38
Wood Framed and Other	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-38	R-38	R-38	R-38	R-38	R-38
Slab-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	~~NR~~ R-10 for 24" below	~~R-10 for 24" below~~ R-15 for 24□ below	~~R-10 for 24" below~~ R-15 for 24" below	~~R-10 for 24" below~~ R-15 for 24" below	~~R-10 for 24" below~~ R-15 for 24" below	~~R-10 for 24" below~~ R-20 for 24" below	~~R-15 for 24" below~~ R-20 for 48" below	~~R-15 for 24" below~~ R-20 for 24" below	~~R-15 for 24" below~~ R-20 for 48" below	~~R-15 for 24" below~~ R-20 for 48" below	~~R-20 for 24" below~~ R-25 for 48" below
Heated slabs	R-7.5 for 12" below	R-7.5 for 12" below	~~R-7.5 for 12" below~~ R-10 for 24" below	~~R-7.5 for 12" below~~ R-15 for 24" below	~~R-10 for 24" below~~ R-15 for 24" below	~~R-10 for 24" below~~ R-15 for 24" below	~~R-15 for 24" below~~ R-20 for 24" below	~~R-15 for 24" below~~ R-20 for 48" below	~~R-15 for 36" below~~ R-20 for 48" below	~~R-15 for 36" below~~ R-20 for 48" below	~~R-15 for 36" below~~ R-20 for 48" below	~~R-20 for 48" below~~ R-25 for 48" below	R-~~20~~ 25 for ~~24~~ 48" below	R-~~20~~ 25 for 48" below	R-~~20~~ 25 for 48" below	R-20 for ~~48" below~~ full slab
Opaque Doors																

CLIMATE ZONE	1		2		3		4 ~~EXCEPT MARINE~~		5 ~~AND MARINE 4~~		6		7		8	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
Swinging	~~U-0.61~~ U-0.70	~~U-0.61~~ U-0.50	~~U-0.61~~ U-0.70	~~U-0.61~~ U-0.50	~~U-0.61~~ U-0.70	~~U-0.61~~ U-0.50	~~U-0.61~~ U-0.50	~~U-0.61~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50	~~U-0.37~~ U-0.50
Roll-up or sliding	~~R-4.75~~ U-1.45	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50	~~R-4.75~~ U-0.50

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = *Liner System*— *Liner systems* shall have a minimum R-3 thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor ~~A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.~~

FC = *Filled Cavity – Filled Cavity* assemblies shall have a minimum R-5 thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor

a. Assembly descriptions can be found in ANSI/ASHRAE/IES~~NA~~ 90.1 Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

~~e. Steel floor joist systems shall be insulated to R-38.~~

Reason: This proposal will make the fenestration requirements consistent with those published in addendum bb to ANSI/ASHRAE/IES Standard 90.1. This addendum was a result of much investigations into the cost effectiveness of various assembly types. There was also additional research done for different types of metal building assemblies. This proposal incorporates corrections to the current IECC for those building types.

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

C402.1.2T-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was uncomfortable with the reductions in stringency included in the proposal. The committee was also not willing to approve increases in stringency at this time. There was uncertainty if the cost analysis looked at each change, up or down, or whether it looked at the combined effect.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.1.2 OPAGUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4		5		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Floors																
Metal Joist/framing	U-0.350	U-0.350	U-0.038	U-0.038	U-0.038	U-~~0.032~~ 0.038	U-0.038	U-0.038	U-0.038	U-0.038	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032

(Portions of Table not shown remain unchanged)

TABLE C402.2 OPAQUE THERMAL ENVELOPE REQURIEMENTS[a]

CLIMATE ZONE	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Floors																
Metal Joist/framing	NR	NR	R-30	R-30	R-30	R-~~38~~ 30	R-30	R-30	R-30	R-30	R-38	R-38	R-38	R-38	R-38	R-38
Slab-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	R-10 for 24" below	R-15 for 24" below	R-15 for 24" below	R-15 for 24" below	R-~~15~~20 for 24" below	R-20 for 24" below	R-20 for 48" below	R-20 for 24" below	R-20 for 48" below	R-20 for 48" below	R-25 for 48" below

(Portions of Table not shown remain unchanged)

Commenter's Reason: Regarding the original proposal as submitted:

This proposal aligns the IECC with ASHRAE 90.1-2013. The ASHRAE tables were the result of 4 years of work resulting in 4 public review drafts and resolving over 100 comments. The basis of the first public review draft was a cost analysis and the subsequent public review drafts were based on additional cost analyses and changes due to public comments. The analyses used updated costs and economic parameters compared to previous versions of ASHRAE 90.1. Each of the public review drafts considered each assembly for each climate. They also looked at each assembly relative to other assemblies and other climates. The result is the tables in this code change proposal, which show an increase in stringency for some assemblies and a decrease in stringency for other assemblies compared to the 2012 IECC. For metal building roofs and walls, these tables incorporate revised assemblies that are more commonly used and more economically feasible than those in the IECC. These tables also correct U-factors used in the IECC to match the R-Values. The U-factors have been determined using a common methodology that is explained in Appendix A of ASHRAE 90.1.

Specifically, R-values have been increased for roof insulation entirely above deck in five climate zones. Attic insulation R-values have been increased in four climate zones. For other assemblies (other than roofs and metal buildings), the decreases in R-values have been in warmer climate zones where additional insulation has less effect on energy savings and is therefore not as cost effective. The increases in stringency have been in the colder climate zones where additional insulation saves more energy and is more cost-effective. PNNL has reported that these changes to 90.1-2013 compared to 90.1-2010 save a significant 4% energy on a total building energy load basis.

Climate Zone (CZ) Marine 4 has milder summers than the rest of CZ 4; therefore, the criteria for Marine 4 belong with CZ4 and not CZ5. There is no technical, economic, or weather-related basis for placing CZ Marine 4 criteria with CZ5 criteria.

Regarding the change in this public comment: The values in three cells have been corrected.

CE90-13

Final Action: AS AM AMPC____ D

CE91-13
Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
								Roofs								
Insulation entirely above deck	U-0.048	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.039~~ U-0.032	~~U-0.039~~ U-0.032	~~U-0.039~~ U-0.032	~~U-0.039~~ U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
								Roofs								
Insulation entirely above deck	R-20ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-30ci	R-30ci	R-~~30~~ 35ci	R-35ci	R-35ci	R-35ci

(Portions of Table not shown remain unchanged)

Reason: This proposal modifies the thermal envelope requirements for above-deck roof insulation to be consistent with the recently revised ASHRAE 90.1 Addendum bb. The change is necessary to ensure that the IECC is at least as efficient as 90.1

Cost Impact: The code change proposal will increase the cost of construction. This proposal will increase the initial cost of construction, but will result in reduced energy costs that will result in a short payback.

C402.1.2T-EC-FISCHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee concluded that the current minimums in the code are adequate and there is no need to increase stringency at this time.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: Each year about 2.5 billion square feet of roof coverings are installed on existing buildings, representing about 75% of the overall roofing market. Unlike other opaque envelope components, roofing is unique with so much of the market in existing buildings. Because most roof replacement projects do not involve alterations to other portions of the building envelope, the code should provide consistent R-Value requirements. With IECC and ASHRAE 90.1 values diverging in some climate zones, permit applicants can look for the lesser insulation requirement and pick an R-Value from either set of requirements.

It seems illogical that permit applicants can complete their design in this manner. And, since the overall envelope requirements for the IECC and ASHRAE 90.1 are evaluated based on whole building design using new construction as the baseline assumption, it makes no sense to allow roofing applicants to shop the code for the lowest R-Value when replacing the roof. With the selection of roof insulation resulting in a decision that will determine building energy usage for decades, we have to get it right.

CE91-13

Final Action: AS AM AMPC____ D

CE92-13
Table C402.1.2

Proposed Change as Submitted

Proponent: Hal Robbins, Lamtec Corporation (halr@lamtec.com)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	~~U-0.035~~ U-0.037	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029

(Portions of Table not shown remain unchanged)

Reason: During the development of the ANSI/ASHRAE/IES 90.1-2013, "Energy Standard for Buildings except Low-Rise Residential Buildings", there was significant debate regarding the U-Factor associated with the thermal performance of the R-19 + R-11Ls (Liner System). The debate focused on the proposed 0.035 U-Factor for the Liner System, and related to the accuracy of this value due to the variability of the test methodology and the range of data supplied to the committee for this system. Specifically:

- The initial 0.035 U-factor was adopted for this Liner Systems based upon a single test report generated in 2007.
- In 2010 the R-19+R-11 Liner System was retested by an accredited testing laboratory, and a U-Factor of 0.039 was achieved. (a copy of the test report is attached)
- Based upon the range of values provided to the 90.1 Envelope Committee, and their understanding of the variability for this type of thermal testing, the Committee decided to adjust the U-factor being shown for the R-19+R-11 Ls from 0.035 to 0.037.

Our request to change the Metal Building Roof U-Factor being shown for the R-19+R11 Ls from 0.035 to 0.37 in Table C402.1.2 of the 2015 edition of the IECC is necessary to prevent the confusion that will arise if the U-Value assembly requirements do not agree between IECC and ASHRAE. Please keep in mind the following:

- Footnote "a" in IECC tables C402.1.2 and C402.2 references the assemblies shown in the 90.1, Table A.
- In 90.1-2013, Table A2.3 will show the U-Value for the R-19+R-11Liner Systems as 0.037
- If IECC - 2015 is not changed, it will require a U-Value of 0.035 for Climate Zones, 1 (Group R), 2, 3, 4 and 5, and there will not be a corresponding U-Value in 90.1 -Table A.
- As such, by default, the user will be driven to the next lower U-Value in the table, a far more expensive system and one that far exceeds the needs of the project.
- This request to change the U-Value for the Liner System from 0.035 to 0.037, should essentially be considered "editorial", as the same insulation levels are being specified.

Cost Impact: This code change proposal will not increase the cost of construction. There should be no cost impact, this is strictly an editorial change.

C402.1.2T-EC-ROBBINS.doc

Committee Action Hearing Results

Committee Action:

Committee Reason: The committee concluded that the proposal, like CE91-13 was increasing stringency which they could not support.

Assembly Action:

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Hal Robbins, Lamtec Corporation, requests Approval as Submitted

Commenter's Reason: This is an editorial request to eliminate potential confusion relating to the U-Factor specified in Table C402.1.2 for the R-19 + R11 Liner System, and the U-Factor for the same system as shown in ASHRAE Table A2.3(in Appendix A of the 90.1 std).

According to footnote "a" at the bottom of IECC Table C402.1.2, construction details for the various insulation assemblies can be found in ASHRAE Table A.

However, Table A2.3 in the 90.1-2013 Standard will show the U-Factor for the R-19 + R-11 Liner Systems as 0.037, not 0.035 as currently shown in IECC 2012. This will be extremely confusing to the users of the standard and the Code officials.

This proposal request that the 0.035 U-value shown in Table C402.1.2 be changed to 0.037 to establish agreement between Table C402.1.2 and the ASHRAE Table A2.3. See modified table below.

<u>It is important to note that this is not a change in the prescribed system or a reduction in stringency; it is an editorial change to establish agreement and avoid future confusion.</u>

CE92-13

Final Action: AS AM AMPC____ D

CE94-13
Table C402.1.2

Proposed Change as Submitted

Proponent: Martha G. VanGeem, representing Masonry Alliance for Codes and Standards

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	~~U-0.142~~ U-0.151	~~U-0.142~~ U-0.151	~~U-0.142~~ U-0.151	U-0.123	~~U-0.110~~ U-0.123	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	~~U-0.078~~ U-0.080	U-0.071	~~U-0.061~~ U-0.071	U-0.061	U-0.061	U-0.061

Portions of Table not shown remain unchanged)

Reason: According to Section 402.1 of the IECC, the criteria are the R-values specified in Section 402.1.1. The U-factors in Section 402.1.2 are an alternate compliance path. IECC Section 402.1.1 states that the R-values are in Tables C402.2 and C402.3. Therefore, the values in Table 402.2 are the main requirements and Table C402.1.2 lists alternates that should correspond to values in Table C402.2. Most of the mass wall criteria in both of these tables, C402.2 and C402.1.2, are based on the criteria in *ASHRAE/IES Standard 90.1-2010*.

In the last edition of the IECC, errors were introduced into Table C402.1.2 for Climate Zones 1, 2, 3, 6, and 7 for “Mass Walls, Above Grade.” (Corrections to values in Climate Zone 5 are submitted in a separate proposal.)

- For Climate Zone 6, in the governing criteria table C402.2, the requirement is R-13.3ci for the row for “Mass Walls, Above Grade” and the column “Climate Zone 6, All Other.” According to *ASHRAE/IES Standard 90.1-2010*, Table 5.5-6, the U-factor that corresponds to an R-value of R-13.3ci is 0.080, not 0.078.
- For Climate Zone 7, the corresponding U-factor for R-15.2ci is 0.071 not 0.061. This is shown in Table 5.5-7 of *ASHRAE 90.1-2010*. This is also demonstrated by the U-factor for Climate Zone 6 “Group R”, which also has a requirement for R-15.2ci in Table 402.2 and a U-factor of 0.071 in Table 402.1.2 as shown above.
- For Climate Zone 3 “All other”, the corresponding U-factor for R-7.6ci is 0.123, not 0.110. This is shown in Table 5.5-3 for Climate Zone 3 of *ASHRAE 90.1-2010.* This is also demonstrated by the U-factor for Climate Zone 2 “Group R”, which also has a requirement for R-7.6ci in Table 402.2 and a U-factor of 0.123 in Table 402.1.2 as shown above.
- For Climate Zones 1 “All other” and “Group R” as well as Climate Zone 2 “All other,” the corresponding U-factor for R-5.7ci is 0.151, not 0.142. This is shown in Tables 5.5-1 and 5.5-2 of *ASHRAE 90.1-2010.*

Correcting these U-factors will make the IECC less confusing and thereby simplify it and increase its use.

Therefore, the U-factors should be changed as shown in Table 402.1.2 for the row for “Mass Walls, Above Grade” for the Climate Zones 1, 2, 3, 6, and 7 to correct these errors.

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

C402.1.2T #1-EC-VANGEEM.doc

Committee Action Hearing Results

Committee Action: **A**

Committee Reason: The proposal corrects values in the table.

Assembly Action:

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of CE94. CE94 increases the U-factors for mass walls in climate zones 1, 2, 3, 6 and 7, which amounts to a reduction in energy efficiency and stringency for these types of buildings under this compliance option. We do not support backsliding on the energy efficiency requirements of the code, particularly without a compelling justification. This proposal also creates a new inconsistency in climate zone 7 between the U-factors for "All other" and "Group R" while the R-values are identical. While the proponent and the committee identified these changes as "corrections," they mistakenly start from the premise that the U-factors must be directly and exactly calculated from the comparable R-values. In our view, the baseline efficiency required by the code for opaque walls begins with the U-factor, since it is a far more precise number. If the R-values and U-factors are not comparable, then the R-value should be adjusted to greater efficiency rather than making the U-factor less efficient.

CE94-13

Final Action: AS AM AMPC____ D

CE95-13
Table C402.1.2

Proposed Change as Submitted

Proponent: Martha G. VanGeem, representing Masonry Alliance for Codes and Standards

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	~~U-0.078~~ <u>U-0.090</u>	~~U-0.078~~ <u>U-0.080</u>	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061

(Portions of Table not shown remain unchanged)

Reason: According to Section 402.1 of the IECC, the criteria are the R-values specified in Section 402.1.1. The U-factors in Section 402.1.2 are an alternate compliance path. IECC Section 402.1.1 states that the R-values are in Tables C402.2 and C402.3. Therefore, the values in Table 402.2 are the main requirements and Table C402.1.2 lists alternates that should correspond to values in Table C402.2.

In the last edition of the IECC, errors were introduced into Table C402.1.2 for Climate Zones 5 and Marine 4 for "Mass Walls, Above Grade." In the governing criteria table C402.2, the requirement is R-11.4ci for the row for "Mass Walls, Above Grade" and the column "Climate Zones 5 and Marine 4, All Other." This is the same criteria as for one cell to the left, "Mass Walls, Above Grade" and the column "Climate Zones 4 except Marine, Group R." The U-factor that corresponds to an R-value of R-11.4ci is 0.090, not 0.078, as indicated by the value in "Climate Zones 4 except Marine, Group R."

Most of the mass wall criteria in both of these tables, C402.2 and C402.1.2, are based on the criteria in *ASHRAE/IES Standard 90.1-2010*. For "All other," the corresponding R-value in *90.1-2010* for nonresidential in Table 5.5-5 for Climate Zone 5 on page 30 is R-11.4ci and the corresponding U-factor is 0.90. Therefore the U-factor in C402.1.2 for "All other" should be 0.090 for mass walls in "Climate Zones 5 and Marine 4". In addition, for "Group R," the corresponding R-value in *90.1-2010* in Table 5.5-5 for Climate Zone 5 on page 30 is R-13.3ci and the corresponding U-factor is 0.80. Therefore the U-factor in C402.1.2 for "Group R" should be 0.080. These values will remain the same in *90.1-2013*. Correcting these U-factors will make the IECC less confusing and thereby simplify it and increase its use.

Therefore, in Table 402.1.2 for the row for "Mass Walls, Above Grade" and the column "Climate Zones 5 and Marine 4," the U-factor should be changed to 0.090 for "All other" and the U-factor should be changed to 0.080 for "Group R" to correct these errors.

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

C402.1.2T #2-EC-VANGEEM.doc

Committee Action Hearing Results

Committee Action: **A**

Committee Reason: The proposal corrects values in the table. Action consistent with approval of CE95-13.

Assembly Action:

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing Energy Efficiency Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc. , request Disapproval.

Commenter's Reason: We recommend disapproval of CE95. CE95 increases the U-factors for mass walls in climate zone 5, which amounts to a reduction in energy efficiency and stringency for these types of buildings under this compliance option. In particular, we disagree with the 0.080 U-factor for Group R. We do not support backsliding on the energy efficiency requirements of the code, particularly without a compelling justification. If the R-values and U-factors are not comparable, then the R-value should be adjusted to greater efficiency rather than making the U-factor less efficient.

CE95-13
Final Action: AS AM AMPC____ D

CE96-13
Table C402.1.2, Table C402.2, C402.2.5

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Floors																
Mass[c]	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051

(Portions of Table not shown remain unchanged)

a. Opaque assembly U-factors, C-factors, and F-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.
b. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
c. "Mass floors" shall include floors weighing not less than:
   1. 35 psf (170 kg/m^2) of floor surface area; or
   2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than 12 pounds per cubic foot (pcf) (1900 kg/m^3).

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Floors																
Mass[h]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.
LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block is required, otherwise use the *U*-factor compliance method in Table C402.1.2.
c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in./h-f^2 F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. Steel floor joist systems shall ~~to~~ be insulated to R-38.
a. "Mass floors" shall include floors weighing not less than:
   1. 35 psf (170 kg/m^2) of floor surface area; or
   2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than 12 pounds per cubic foot (pcf) (1900 kg/m^3).

C402.2.5 Floors over outdoor air or unconditioned space. The thermal properties (component *R*-values or assembly *U*-, *C*- or *F*-factors) ~~resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly~~ of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.2 or C402.2, based on the construction materials used in the floor assembly.
~~"Mass floors" shall include floors weighing not less than:~~
~~1. 35 psf (170 kg/m^2) of floor surface area; or~~
~~2. 25 psf (120 kg/m^2) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m^3).~~

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons for this proposal are as follows:
a) This proposal moves and clarifies, but does not delete the requirements of Section C402.2.5 of the 2012 IECC.
b) In the I-Codes, text should not rely on section titles for application. Therefore, the information in the title was added to the code text.
c) The first sentence in Section C402.2.5 is revised to clarify that the provisions for floors over outdoor air or unconditioned space are also applicable to the assembly U-, C- and F-factors of Table C402.1.2.
d) The original language of Section C402.2.4 did not clearly indicate what the "mass floor" requirements were relevant or related to. These requirements are more appropriately and clearly applied as footnotes to Tables C402.1.2 and C402.2. By moving the information to the appropriate tables, unintentional non compliance will decrease (compliance will increase).

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C402.1.2T #1-EC-THOMPSON-SEHPCAC.doc

Committee Action Hearing Results

Committee Action: A

The following errata were not posted to the ICC website. The first printing of the 2012 IECC has an incorrect value in the second 'definition' of mass floors. It shows 12 pcf where 120 is the correct value. The changes below reflect the correct value.

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

c. "Mass floors" shall include floors weighing not less than:

   1. 35 psf (170 kg/m^2) of floor surface area; or
   2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than ~~12~~ 120 pounds per cubic foot (pcf) (1900 kg/m^3).

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

f. "Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m^2) of floor surface area; or
2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than ~~12~~ 120 pounds per cubic foot (pcf) (1900 kg/m^3).

C402.2.5 Floors over outdoor air or unconditioned space. The thermal properties (component *R*-values or assembly *U*-, *C*- or *F*-factors) ~~resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly~~ of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.2 or C402.2, based on the construction materials used in the floor assembly.
~~"Mass floors" shall include floors weighing not less than:~~

1. ~~35 psf (170 kg/m²) of floor surface area; or~~
2. ~~25 psf (120 kg/m²) of floor surface area if the material weight is not more than 120 pcf (1,900 kg/m³).~~

(Portions of proposal not shown remain unchanged)

Committee Reason: The proposal clarifies the application of the values in both tables, by providing a description of what are mass walls as a footnote to the tables. It replaces text which is somewhat disconnected in a section of the code.

Assembly Action:

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment 1:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC; requests Disapproval.

Commenter's Reason: It has long been understood that each component in both the residential and commercial tables have their own text section to go with them. The code tells us in Section 401.2 Application, that you have to comply with the listed code sections, not just the tables. In fact, it doesn't even reference the tables directly; the individual code sections reference the tables, not vice versa. We aren't supposed to find code requirements in the footnotes; they are in those specific sections. The footnotes are supposed to be used to just call out or clarify small items within the table.

Every code cycle we try to take code language out of the footnotes and keep them in the text sections so that the footnotes remain understandable. This proposal removes the verbiage in the actual code text dealing with Mass Floors and puts it in the footnote, making a long footnote without much justification for doing it. Does it really make it more understandable by it being in a long footnote than being in the body of the code? A better use of this footnote might be to reference back to Section C402.2.5, where the reader could find all of the requirements for mass floors if they felt there was confusion dealing with those requirements. However, then we would set a precedence for referring the reader to the associated text when we don't do that for any of the other components in any of the tables.

We would ask for disapproval of this proposal because we do not feel as though it has made the code any better as it pertains to understanding the requirements for Mass Floors.

Public Comment 2:

Martha VanGeem, representing self, requests Disapproval.

Commenter's Reason: Adding the text from Section 402.2.5 to a footnote in the table will create too many unnecessary footnotes to the table, especially when combined with other proposals such as CE106 that take text and add it as footnotes to the table.

Also, the footnote is only added to Table C402.2 and not Table C402.1.2. This could create confusion because mass floor criteria are also specified in C402.1.2. The defining terminology for mass floors should remain in Section 402.2.5 because it is used in more than one place; it is used in the two tables.

CE96-13
Final Action: AS AM AMPC____ D

CE97-13

Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.~~064~~ U-0.057	U-0.057	~~U-0.064~~ U-0.052	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	~~U-0.051~~ U-0.057	~~U-0.051~~ U-0.057	~~U-0.051~~ U-0.052	~~U-0.051~~ U-0.052	~~U-0.036~~ U-0.045	~~U-0.036~~ U-0.045

(Portions of Table not shown remain unchanged)

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Walls, Above Grade																
Mass	R-5.7ci	R-5.7ci	R-5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 +3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-~~7.5ci~~ 3.8ci or R20 ~~+ 3.8ci~~	R-13 + R-7.5ci ~~or~~ R20 + 3.8ci; or R22	R-13 + R-7.5ci; ~~or~~ R20 + 3.8ci; or R22	R-13 + R-7.5ci; ~~or~~ R20 + 3.8ci; or R27	R-13 + R-7.5ci; ~~or~~ R20 + 3.8ci; or R27	R-13 + R-15.6ci; ~~or~~ R20 + 10ci; or R32	R-13 + R-15.6ci; ~~or~~ R20 + 10ci; or R32

(Portions of Table not shown remain unchanged.)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to correct anomalies in these tables and present additional options to increase the usability and effectiveness of the codes prescriptive building envelope requirements. Detailed reasons for this proposal are as follows:

1) Table C402.1.2
   a. In Table C402.1.2, some of the U-factors in CZ7 seem to be disjointed without reason. In the both the "Group R" and the "All Other" cells in CZ7, wood stud walls and steel stud walls have identical values except that the "All Other" cell for steel studs differs significantly. It seems reasonable to simply make all four cells values identical. Preliminary PNNL modeling has shown that merging U-factors to one performance level for all materials for building envelopes is an effective strategy for gaining more efficiency in codes. Certainly, it meets the intent of the cost effectiveness mandate from the Energy Act.
   b. In Table C402.1.2, the U-factors for both wood stud and steel stud walls are disjointed to an even greater extent than those in CZ7 or CZ8. The SEHPCAC believes that bringing these U-factors into closer alignment with each other and with adjacent climate zones makes this code more enforceable, more readily achieved and more understandable. In achieving those objectives, the SEHPCAC believes that the biggest goal, adoptability, is also achieved. Any efficiency improvement is unimportant if the model code in which it is embodied is never adopted.
   c. In the CZ8 columns of Table C402.1.2, U-factors were used that were simply in line with the descending values for the cells in CZ 1-7.
2) Table C402.2
   a. For Table C402.2 this proposal provides "cavity only" insulation options for each climate zone entry in the "Wood Framed and Other" row. This is proposed in order to provide a practical solution for energy efficiency with which builders are familiar and that they can readily execute to a satisfactory level. Buy "cavity only," it is meant that the insulation will be placed only in the cavities between studs and that c.i. (continuous insulation, such as foam insulation sheathing applied on the exterior side of studs) is not required in association with it. These "cavity only" options make compliance with, and effectiveness of, the code more likely by offering choices to designers and builders that are readily implementable.

      Please note that the cavity only insulation option is just that: it is an option. As the existing cavity plus continuous insulation (ci) options also remain in place, the cavity only options do not necessarily increase costs, they simply provide added flexibility.

      Also note that the cavity only option R-values, as minimum values, do not preclude the use of insulation with higher R-values where insulation materials are not readily available in the exact R-values provided in the Table. This is intentional. R-values differ for various insulation types and this puts all types on a level playing field. The R-values proposed for cavity only insulation Table C402.2 are derived from the U-factors for equivalent building envelope assemblies in Table C402.1.2.

      Design professionals and builders have asked ICC, Code Trainers, and other professionals "what is the option in wood framed walls for cavity only insulation." This addition provides that design flexibility and information to builders to understand the cavity only insulation requirements option. The third R-value listed in the row for wood framed wall climate zone 6 – 8, is a calculated value and may not represent thermal insulation products available off the shelf at building supply centers. Achieving the R-value in a cavity only installation may require a mix of insulation materials to achieve these values.
   b. Beginning with Climate Zones 5 and Marine 4, the second option in each cell in the "Wood Framed and Other" row has been restored to "cavity-only". In CZ5-M4, the residential cell R-values were made similar to the "All Other" cell because the U-factor values in Table C402.1.2 are the same for the corresponding table entries.
   c. The R-values in both cells of Climate Zone 6 in the "Wood Framed and Other" row were revised to reflect equivalency calculations, as performed by the American Wood Council, that were based on U-factors for corresponding entries in Table C402.1.2.

Below is the summary page of the Excel spreadsheet used to determine R-value equivalents to U-factor inputs. This is the system by which the R-values in Table C402.2 were determined from the U-factors in Table C402.1.2.

U-factor to R-value equivalency spreadsheet

Material	R	Framing Factor		25%
inside air film	0.68	Stud Path	2x4	6.30
1/2" Gyp.	0.45		2x6	8.80
2x4 @ 16" o.c.	4.375	Cavity - Insulation		1.92
2x6 @ 16" o.c.	6.875			
7/16" OSB	0.62			
outside air film	0.17			

Siding Type	Average Thickness	R_{siding}	Stud Size: 2 x 4			2 x 6				
			Cavity Insulation							
			R-13	R-15	R-17	R-17	R-19	R-20	R-22	R-24
			Wall + Siding U-factor							
			13	15	17	17	19	20	22	24
Baseline (no siding)		-	0.090	0.084	0.079	0.068	0.064	0.063	0.060	0.057
Aluminum, Steel, or Vinyl siding										
uninsulated (hollow-back)	Varies	0.62	0.084	0.079	0.075	0.065	0.061	0.060	0.057	0.055
insulated (R-2)	Varies	2.00	0.074	0.070	0.066	0.059	0.056	0.054	0.052	0.050
insulated (R-3)	Varies	3.00	0.069	0.065	0.061	0.055	0.053	0.051	0.049	0.047
Brick veneer (¾" air space)	3-5/8"	1.26	0.079	0.074	0.070	0.062	0.059	0.057	0.055	0.052
Hardboard siding	7/16"	0.67	0.084	0.078	0.074	0.065	0.061	0.060	0.057	0.055
Plywood siding (edges lapped)	3/8"	0.59	0.085	0.079	0.075	0.065	0.061	0.060	0.057	0.055
Wood siding										
Drop (8")	1"	0.79	0.083	0.078	0.073	0.064	0.061	0.059	0.056	0.054
Bevel (8", lapped)	1/2"	0.81	0.083	0.077	0.073	0.064	0.061	0.059	0.056	0.054
Bevel (10", lapped)	3/4"	1.05	0.081	0.076	0.072	0.063	0.060	0.058	0.055	0.053

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: Where the U-factors in the table are proposed to be decreased, this proposal may increase the cost of construction. Where cavity only insulation options have been provided, this proposal may decrease the cost of construction in certain applications.

C402.1.2T #4-EC-THOMPSON-SEHPCAC.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proponent asked for disapproval in order to prepare a public comment to address errors in the proposal.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Manz, City of Blaine, MN, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	**6**		**7**		**8**	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
Walls, Above Grade						
Wood Framed and Other	R-13 + R-7.5ci or R20 + 3.8ci<u>; or R21</u>	R-13 + R-7.5ci<u>;</u> or R20 + 3.8ci<u>; or R21</u>	R-13 + R-7.5ci<u>;</u> or R20 + 3.8ci<u>; or R21</u>	R-13 + R-7.5ci<u>;</u> or R20 + 3.8ci<u>; or R21</u>	R-13 + R-15.6ci<u>;</u> or R20 + 10ci	R-13 + R-15.6ci<u>;</u> or R20 + 10ci

(Portions of Table not shown remain unchanged)

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

Walls, Above Grade						
CLIMATE ZONE	**6**		**7**		**8**	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Wood framed and other	~~U-0.051~~ <u>U-.057</u>	~~U-0.051~~ <u>U-.057</u>	~~U-0.051~~ <u>U-.057</u>	~~U-0.051~~ <u>U-.057</u>	U-0.036	U-0.036

(Portions of Table not shown remain unchanged)

Commenter's Reason: The State of Minnesota is amending the 2012 IECC to permit a 2" by 6" nominal wood framed wall cavity-only insulation option for both CZ 6 and 7. There is little demand for, and considerable opposition to, mandating continuous insulation or deeper insulation cavities than provided by 2" by 6" framing.

R21 was selected as the appropriate performance metric because it does not discriminate against materials. R21 also corresponds with proposed amendments to important neighboring jurisdictions, keeping a level field for cross-border economic competition. Minnesota neighbors include:

- North Dakota, which is proposed to require R20 in CZ 6 and R21 in CZ 7.
- South Dakota; a home rule state with energy codes adopted as local options. Sioux Falls, SD's largest city, is in CZ 6 and a short distance from the MN border. It has elected to amend the 2012 IRC energy provisions to R20.
- Wisconsin, which currently administers R19 in CZ 6 and R21 in CZ 7. As of July 5, 2013 there are no administrative rules proposed to change these requirements on WI's state website nor are there indications of a 2012 IECC adoption initiation.
- Iowa administers R20 in CZ 6. As of July 5, 2013 there are no administrative rules proposed to change these requirements on IA's state website nor are there indications of a 2012 IECC adoption initiation.

We request that the assembly overturn the committee action and approve CE97 as modified by this public comment.

This proposal will decrease the cost of construction.

CE97-13

Final Action: AS AM AMPC____ D

CE98-13
Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Mark Halverson, APA-The Engineered Wood Association (mark.halverson@apawood.org) Paul Coats, The American Wood Council

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal buildings	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other	U-~~0.064~~ 0.087	U-~~0.064~~ 0.087	U-~~0.064~~ 0.087	U-~~0.064~~ 0.087	U-~~0.064~~ 0.087	U-~~0.064~~ 0.087	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R13 + 13ci	R-13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 19.5ci	R13 + 13ci	R13 + 19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + 7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R15.6ci	R-13 + R-7.5ci	R-13 + R17.5ci
Wood framed and other	R-13 ~~+ R-3.8ci or R-20~~	R-13 ~~+ R-3.8ci or R-20~~	R-13 ~~+ R-3.8ci or R-20~~	R-13 ~~+ R-3.8ci or R-20~~	R-13 ~~+ R-3.8ci or R-20~~	R-13 ~~+ R-3.8ci or R-20~~	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R13 + R7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8ci	R13 + R15.6ci or R20 +R10ci	R13 + R15.6ci or R20 +R10ci

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.
c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. Steel floor joist systems shall be insulated to R-38.

(Portions of Table not shown remain unchanged

Reason: The above-grade wall *U*-factors and the insulation requirements in Tables C402.1.2 and C402.2 are much more stringent for wood framed walls than the other framing types in Climate Zones 1-3. This proposal brings wood frame walls to levels that are within the range of the other wall types.

The code must be product neutral and not favor one product over the others. The provision of the 2012 IECC require much lower *U*-factors and greater *R*-values in Climate Zones 1-3 for above grade wood framed walls than for the other three types of walls. Codes should not unfairly provide one framing product with an advantage over another. If the goal of the IECC is to save energy, then the code should be "blind" to material types when setting performance levels.

In addition, the amount of energy saved in requiring commercial and multi-family buildings to meet a *U*-factor of 0.064 as opposed to the proposed *U*-factor of 0.087 is minimal in these warmer climate zones. When the additional cost of construction is compared to the energy savings, the provision to build at the 0.064 *U*-level is not cost effective.

Table 1 shows a *U*-factor calculation using standard *R*-values. A 7/8-inch stucco *R*-value is used instead of single-coat stucco, as is recommended when applied to wood structural panels. The 7/16-inch sheathing is used in this system as it is a typical exterior sheathing thickness for wood frame commercial walls.

This proposal works to correct those discrepancies between framing materials while bringing the Commercial IECC in-line with the Residential IECC.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations Climate Zones 1-3, 2x4 Wood Framed Walls

Wall Thermal Resistance by Component	2x4 Wall - R13		
	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17		
Stucco 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panel Sheathing (7/16")	0.62		
Stud/Cavity Insulation	4.375	13	
Interior Gypsum	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Value	6.59	15.21	**11.46**
Total Wall U-Factor	0.152	0.066	**0.0873**

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

C402.1.2T #2-EC-COATS-HALVERSON.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: While the proposal is based on analysis conducted for the BB addendum to the ASHRAE 90.1 standard, the proposal only picked a few of the BB factors to bring forward. The result would appear to favor one industry over another.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mark Halverson, APA – The Engineered Wood Association; Paul Coats, American Wood Council (AWC), request Approval as Submitted.

Commenter's Reason: We stand on the reason statement for the original proposal. These proposed modifications add similar numbers from the BB addendum to the ASHRAE 90.1 standard with slight modifications to keep both the "residential" cells and the "all other" cells the same value in each of the climate zones as is found in most of these tables. The cost impact of going from R-13 to R-20 walls in these warm climates is not cost effective. We urge the approval of this common sense change to Tables C402.1.2 and C402.2.

CE98-13
Final Action: AS AM AMPC____ D

CE99-13
Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Mark Halverson, APA-The Engineered Wood Association and Paul Coats, The American Wood Council (mark.halverson@apawood.org)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal buildings	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	~~U-0.051~~ U-0.056	~~U-0.051~~ U-0.056	~~U-0.051~~ U-0.047	~~U-0.051~~ U-0.047	~~U-0.036~~ U-0.047	~~U-0.036~~ U-0.047

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13+ R-19.5ci	R-13 + R-13ci	R-13+ R-19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + 7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R15.6ci	R-13 + R-7.5ci	R-13 + R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 +R-3.8ci	R-13 + R-6.5~~7.5~~ci or R-18~~20~~ +R-3~~3.8~~ci or R-24	R-13 + R-6.5~~7.5~~ci or R-18~~20~~ +R-3~~3.8~~ci or R-24	R13 + R-10~~7.5~~ci or R-20 +R-5~~3.8~~ci or R-28	R13 + R-10~~7.5~~ci or R-20 +R-5~~3.8~~ci or R-28	R13 + R-10~~15.6~~ci or R-20 +R-5~~10~~ci or R-28	R-13 + R-10~~15.6~~ci or R-20 +R-5~~10~~ci or R-28

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. Steel floor joist systems shall be insulated to R-38.

(Portions of Table not shown remain unchanged)

Reason: The above-grade wall *U*-factors and the insulation requirements in Tables C402.1.2 and C402.2 are much more stringent for wood framed walls than the other framing types in Climate Zones 6-8. This proposal brings wood frame walls to levels that are within the range of the other wall types as well as levels that are similar to those found in the residential energy code.

The code must be product neutral and not favor one product over the others. The provision of the 2012 IECC require lower *U*-factors and greater *R*-values in Climate Zones 6-8 for above grade wood framed walls than for the other three types of walls. Codes should not unfairly provide one framing product with an advantage over the other. Since the goal of the IECC is to save energy, it should be "blind" to framing material types when setting performance levels. This proposal works to correct those irregularities between framing materials.

Table 1 shows the *U*-factor calculations for 2x6 and 2x4 walls using a combination of continuous insulation and cavity insulation for Climate Zone 6. The 2x6 wall system uses R18 cavity insulation with R3 continuous insulation and the 2x4 systems incorporates R13 cavity with R6.5 continuous insulation. Both systems result in a *U*-factor of 0.056.

Table 2 shows a calculation for a 2x6 wall system using R24 cavity insulation. The system also incorporates 7/8-inch stucco which is recommended for direct applications to wood structural panels. The 7/16-inch sheathing is used in this system as it is a typical exterior sheathing thickness for wood frame commercial walls. This system results in a *U*-factor of 0.056 and is equivalent to the two systems found in Table 1.

Table 3 shows the *U*-factor calculations for 2x6 and 2x4 walls using a combination of continuous insulation and cavity insulation for Climate Zones 7-8. The 2x6 wall system uses R20 cavity insulation with R5 continuous insulation and the 2x4 systems incorporates R13 cavity with R10 continuous insulation. Both systems result in a *U*-factor of 0.047.

Table 4 shows a calculation for a 2x8 wall system using R28 cavity insulation. A 7/8-inch stucco *R*-value is used as is typical when applied to wood structural panels. The 7/16-inch sheathing is used in this system as it is a typical exterior sheathing thickness for wood frame commercial walls. This system results in a *U*-factor of 0.047 and is equivalent to the two systems found in Table 3.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R18+3			2x4 Wall - R13+6.5		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17			0.17		
Stucco (1-Coat)	0.08			0.08		
Continuous Insulation	3			6.5		
Wood Structural Panels Sheathing	0			0		
Stud/Cavity Insulation	6.875	18		4.375	13	
5/8" Drywall	0.56			0.56		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	11.37	22.49	**18.07**	12.37	20.99	**17.87**
Total Wall U-Factors	0.088	0.044	**0.0553**	0.081	0.048	**0.0559**

Table 2. U-Factor Calculations Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R24		
	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17		
Stucco - 7/8" (3-Coat)	0.18		

Continuous Insulation	0		
Wood Structural Panels Sheathing (7/16”)	0.62		
Stud/Cavity Insulation	6.875	24	
5/8" Drywall	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Values	9.09	26.21	**17.81**
Total Wall U-Factors	0.110	0.038	**0.0561**

Table 3. U-Factor Calculations Climate Zones 7-8 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R20+5			2x4 Wall - R13+10		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17			0.17		
Stucco (1-Coat)	0.08			0.08		
Continuous Insulation	5			10		
Wood Structural Panels Sheathing	0			0		
Stud/Cavity Insulation	6.875	20		4.375	13	
5/8" Drywall	0.56			0.56		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	13.37	26.49	**21.27**	15.87	24.49	**21.56**
Total Wall U-Factors	0.075	0.038	**0.0470**	0.063	0.041	**0.0464**

Table 4. U-Factor Calculations - Climate Zones 7-8 Wood Framed Walls

Wall Thermal Resistance by Component	2x8 Wall - R28		
	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17		
Stucco - 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panels Sheathing (7/16”)	0.62		
Stud/Cavity Insulation	9.063	28	
5/8" Drywall	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Values	11.27	30.21	**21.28**
Total Wall U-Factors	0.089	0.033	**0.0470**

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

C402.1.2T #1-EC-COATS-HALVERSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a cavity only option for the colder climate zones. It does not appear to favor one product type over another. There would appear to be a minor reduction in stringency in the colder climates.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Mark Halverson, APA-The Engineered Wood Association; Paul Coats, The American Wood Council, request Approval as Submitted.

Commenter's Reason: We stand on the reason statement for the original proposal but want to provide calculations in addition to those that were incorporated in our original reason statement. In the original calculations, we did not provide calculations that included exterior gypsum sheathing for the continuous insulation assemblies. These alternative calculations include 5/8" gypsum sheathing and are provided as a point of reference for public comment hearing voters. Also shown are the original R24 and R28 cavity insulation only calculations, which are the minimum-performance assemblies on which the U-factors are based.

We support the Committee recommendation for approval of CE99 as submitted.

Table 1A. U-Factor Calculations Climate Zone 6 - Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R18+3			2x4 Wall - R-13+6.5		
	R-Value Studs	**R-Value Cavity**	**Assembly Value**	**R-Value Studs**	**R-Value Cavity**	**Assembly Value**
Wall - Outside Winter Air Film	0.17			0.17		
Siding - Stucco (1-Coat)	0.08			0.08		
Continuous Insulation	2.5			6.5		
Exterior 5/8" gypsum sheathing	0.56			0.56		
Stud/Cavity Insulation	6.875	18		4.375	13	
5/8" Drywall	0.56			0.56		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	11.43	22.55	**18.14**	12.93	21.55	**18.47**
Total Wall U-Factors	0.088	0.044	**0.0551**	0.077	0.046	**0.0541**

Table 1B. U-Factor Calculations Climate Zone 6 - Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R24		
	R-Value Studs	**R-Value Cavity**	**Assembly Value**
Wall - Outside Winter Air Film	0.17		
Stucco - 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panels Sheathing	0.62		7/16"
Stud/Cavity Insulation	6.875	24	
5/8" Drywall	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	

Total Wall R-Values	9.09	26.21	**17.81**
Total Wall U-Factors	0.110	0.038	**0.0561**

Table 2A. U-Factor Calculations Climate Zones 7-8 Wood Framed Walls

Wall Thermal Resistance by Component	**2x6 Wall - R20+5**			**2x4 Wall - R-13+10**		
	R-Value Studs	**R-Value Cavity**	**Assembly Value**	**R-Value Studs**	**R-Value Cavity**	**Assembly Value**
Outside Air Film	0.17			0.17		
Siding - Stucco (1-Coat)	0.08			0.08		
Continuous Insulation	5			10		
Exterior 5/8" gypsum sheathing	0.56			0.56		
Stud/Cavity Insulation	6.875	20		4.375	13	
5/8" Drywall	0.56			0.56		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	13.93	27.05	**21.89**	16.43	25.05	**22.14**
Total Wall U-Factors	0.072	0.037	**0.0457**	0.061	0.040	**0.0452**

Table 2B. U-Factor Calculations Climate Zones 7-8 Wood Framed Walls

Wall Thermal Resistance by Component	**2x8 Wall - R28**		
	R-Value Studs	**R-Value Cavity**	**Assembly Value**
Wall - Outside Winter Air Film	0.17		
Stucco - 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panels Sheathing	0.62		7/16"
Stud/Cavity Insulation	9.06	28	
5/8" Drywall	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Values	11.27	30.21	**21.28**
Total Wall U-Factors	0.089	0.033	**0.0470**

Public Comment 2:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Walls, Above Grade																
CLIMATE ZONE	**1**		**2**		**3**		**4 EXCEPT MARINE**		**5 AND MARINE 4**		**6**		**7**		**8**	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-~~0.064~~ 0.051	U-~~0.064~~ 0.051	U-0.051	U-0.051	U-~~0,051~~ 0.047	U-~~0.051~~ 0.047	U-0.036	U-0.036

(Portions of Table not shown remain unchanged)

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS

Walls, Above Grade																
CLIMATE ZONE	**1**		**2**		**3**		**4 EXCEPT MARINE**		**5 AND MARINE 4**		**6**		**7**		**8**	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Wood framed and other (cavity insulation only)	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or~~ R-20	~~R13+R-3.8ci or R-20~~ DR	~~R13+R-7.5ci or R-20 +R3.8~~ DR	~~R13+R-7.5ci or R-20 +R3.8~~ DR	~~R13+R-7.5ci or R-20 +R3.8~~ DR	~~R13+R-7.5ci or R-20 +R3.8~~ DR	~~R13+R-7.5ci or R-20 +R3.8~~ DR	~~R13+R-15.6ci or R-20+R-10ci~~ DR	~~R13+R-15.6ci or R-20+R-10ci~~ DR
Wood framed and other (with continuous insulation)[c]	R-12ci	R-12ci	R-12ci	R-12ci	R-12ci	R-12ci	R-12ci	R-12ci	R-16ci	R-16ci	R-16ci	R-16ci	R-18ci	R-18ci	R-24ci	R-24ci
	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-3.8ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-9ci	R-13+ R-9ci	R-13+ R-16ci	R-13+ R-16ci
	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-3ci	R-15+ R-6.5ci	R-15+ R-6.5ci	R-15+ R-6.5ci	R-15+ R-6.5ci	R-15+ R-8ci	R15+ R-8ci	R-15+ R-14ci	R-15+ R-14ci
	-	-	-	-	-	-	-	-	R-18+ R-4ci	R-18+ R-4ci	R-18+ R-4ci	R-18+ R-4ci	R-18+ R-5.5ci	R-18+ R-5.5ci	R-18+ R-14ci	R-18+ R-14ci

DR = Design required

(Portions of Table not shown remain unchanged)

Commenter's Reason: While this public comment could have taken an approach to request disapproval of CE99-13 for its many technical flaws (see "Problems with CE99-13" below), it instead seeks to: 1) restore a consistent analysis basis for all R-value solutions in Table C402.2 for wood framed walls, 2) improve table formatting to separately list cavity-only and exterior insulation-only options, 3) support improved energy efficiency, and 4) avoid roll-backs of the 2012 IECC values for unjustified reasons. This public comment achieves these objectives and benefits through multiple features:

1. First, this public comment makes NO CHANGE to U-factors for Climate Zones 1 through 4 except Marine or the R20 cavity only R-value solution or the R-13 + R-3.8ci solution. For these climate zones, the only change is in formatting Table C402.2 to provide for additional R+Rci options that are necessitated in colder climate zones for reasons that follow.
2. Corrects the U-factor in Climate Zone 5 and Marine 4 to agree with the R-value solutions used for Group R buildings in the same climate zone as found in the current 2012 IECC provisions. This U-factor (0.051) for Climate Zone 5 is also consistent with the ASHRAE 90.1 provisions.
3. Restores the U-factor for Climate Zone 6 back to the U-factor (0.051) in the 2012 IECC and also ASHRAE 90.1.
4. Retains the U-factor proposed in CE99-13 for Climate Zone 7 as this U-factor (0.047) creates an appropriate transition between Climate Zones 6 and 8 and modestly improves energy efficiency in Climate Zone 7.
5. Restores the 2012 IECC U-factor (0.036) for Climate Zone 8, the most extreme and broad ranging climate zone in the code.
6. Adds multiple R-value that provide moisture control and flexibility in selecting walls that are compliant with the required U-factors.
7. Uses a proven method to control moisture in walls with cavity insulation and continuous insulation based on the experience in Canada dating back to the 1995 National Building Code of Canada and supported in the technical literature. The approach is based on minimum exterior continuous insulation to interior cavity insulation ratios (Re/Ri) by climate zone. This same methodology received a positive review by the residential building committee for the vapor retarder provisions of the IRC (refer to public comment on RB358 for additional information).
8. Reformats Table C402.2 by separating wood frame walls into two categories (cavity insulation only and with continuous insulation) for ease of use and to better distinguish these methods and provide flexibility in meeting the required U-factors.
9. Places a design required (DR) for cavity only insulation solutions in Climate Zone 5-8 (which is an expansion of the recognition of cavity only solutions relative to the 2012 IECC). This approach is taken due to the high R-values required and complications with determining effective, compressed R-values based on stud cavity size and insulation product ratings, etc. Clearly, additional design information and data is needed and is currently lacking in the code and in the description of what the R-values actually mean in the CE99 proposal. Thus, a "DR" approach provides the flexibility to develop prescriptive solutions with consideration of appropriate design data to ensure the solution actually meets the required U-factor. (Note that the current code provides no such recognition of cavity insulation in the colder climate zones).
10. Finally, given the broad range of "coldness" in Climate Zone 8, the R18+R14ci solution as shown is conservative (U-factor is less than 0.036). This was done by use of the Re/Ri ratio limits as described above to provide for moisture condensation control based on Canadian building code practices and experience (see note 7 above).

For all of the above reasons and multiple benefits that improve, clarify, restore, and strengthen these provisions in important ways, your support for this public comment is kindly requested at the final action hearing.

Problems with CE99-13:

A number of problems have been identified with the original CE99-13 proposal (and a related CE110-13 proposal) that this public comment intends to resolve in a coordinated and technically robust manner. The problems with CE99-13 include:

1) The assumptions behind the analysis used to derive the specific R-value changes made in CE99-13 are inconsistent with the original assumptions used for the remainder of Table C402.2. The net result is a technically conflicted table with significant practical consequences as described in points 2 and 3 below. The analysis assumptions used uniformly to develop the entire table for the 2012 IECC are documented in a white paper by Britt/Makela available at http://fsc.americanchemistry.com. This document was shared with the ICC SEHPAC committee by ICC-ES and this public comment uses that same analysis approach uniformly for the entire table to ensure consistency in the technical basis for the table in all climate zones, just as was done for the 2012 IECC. A detailed disclosure of the analysis will be made available at http://fsc.americanchemistry.com prior to the public hearing.

   RECOMMENDATION #1: Support this public comment to restore Table C402.2 to a consistent and accepted basis of analysis as currently provided in the 2012 IECC commercial building provisions. (Note that RE-50 was approved as submitted for the same reason).

2) Some significant technical problems and impacts associated with CE99-13 were not fully understood until after the first hearing. These include:
   a. Omits an R-value for non-insulation materials resulting in an unconservative estimate of the cavity-only R-value. R-24 on a 2x6 wall has a 0.058 U-factor, not 0.056 as CE-99 suggests.
   b. Does not account for the difference between header and stud R-factors as is done for the remainder of the table. Again, this is unconservative.
   c. Unconservative assumptions for wall thickness on cavity-only assemblies. The cavity insulation R-value is specific to the cavity depth. Use of higher R-values in 2x6 assemblies limits the use of certain insulation materials. For some materials, users must adjust for insulation compression into a smaller cavity to achieve the effective R-values and U-factors as analyzed. Yet, guidance and data is omitted to ensure the

d. table is used in this manner. For example, it would take approximately an R-38 fiberglass batt 12” thick compressed to a thickness of 5.5” deep to create an effective R-24 performance. It would be more appropriate to assume a 2x8 cavity, instead of 2x6. The original CE99 is incomplete without this additional information and can lead to misuse and improper enforcement.

RECOMMENDATION #2: Support this public comment to remove these inconsistencies in the basis for R-value solutions in different parts of Table C402.2 as caused by CE99-13. Such technical inconsistencies alone should warrant disapproval of CE99-13 unless modified per this public comment.

NOTE: This public comment supports the inclusion of prescriptive deep cavity insulation only solutions in Climate Zones 5-8, but until additional information regarding cavity size and compressed insulation effective R-values are provided to enable such solutions, a “DR” (design required) is indicated. This approach acknowledges that an R-value solution is permissible and possible but that additional design data (per Note 2(c) above) must be considered that is not presently included in the code or in Table C402.2.

3) The proponent’s rationale for changing some U-factors in Table C402.1.2 is flawed or incomplete. The committee’s approval was based, at least in part, on the proponent’s argument to improve the consistency of U-factors for wood framing in comparison to other materials, particularly metal framing. But, it failed to disclose that the requirements in the 2012 IECC were already consistent and that the basis of “consistency” in these energy code requirements is not just a matter of U-factor equivalency for a couple of important reasons:
   a. The first reason is the cost-benefit basis of requirements between material types. Thus, the selective lowering the U-factor for wood framing effectively imbalances the cost-effectiveness basis of U-factors for each material type to favor wood framing over steel framing.
   b. The second reason is that the proposal does not consider differences in moisture condensation control within walls and that this is closely associated with the U-factor used for steel framing vs. wood framing. For example, the metal framed U-factors result in R-value solutions that better control moisture due to the higher ratio of continuous insulation to cavity insulation (which prevents the wall interior temperatures from dropping below the dew-point temperature). Because this was not considered in CE99, it actually expands inconsistencies between wood and steel framing where continuous insulation is used and potentially also where large amounts of cavity insulation only is used in colder climates.

RECOMMENDATION #3: U-factors and the associated R-value solutions and their equivalency between material types must be viewed from both energy cost-effectiveness perspective AND moisture/durability perspective. Neither of these matters of performance was considered in the proposed changes in CE99-13 and, thus, the proposal does not make things more consistent; it actually increases inconsistencies in some cases. Support this public comment to better address these issues caused by CE99-13 and ensure robust requirements and prescriptive solutions that are product neutral and moisture resilient.

Public Comment 3:

Eric Makela, Brit/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a] CLIMATE ZONE

Walls, Above Grade																
CLIMATE ZONE	**1**		**2**		**3**		**4 EXCEPT MARINE**		**5 AND MARINE 4**		**6**		**7**		**8**	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-~~0.064~~ 0.056	U-0.056	U-0.056	U-0.047	U-0.047	U-0.047	U-0.047

(Portions of Table not shown remain unchanged)

Commenter's Reason: The proponent of EC99 provides no reason for why the changes were made to the R-value table – only that the requirements were too stringent and only apply to wood frame walls which isn't a justification for making the change.

During the development of the envelope provisions for the 2012 IECC commercial code, the wood framed wall R-values for Climate Zone 5 and Marine 4 for Group R were modified without modifying the corresponding U-factor in Table C402.1.2. This over site by the proponents of the code change proposal created an inconsistency between the R-value requirements in Table C402.2 and the U-factor requirements in Table C402.1.2. Several of the U-factors that were used to populate Table C402.1.2 came directly from ASHRAE 90.1-2010 in addition to the corresponding R-values. In this case the R-value requirement of R-13 + R-7.5ci was brought over but not the corresponding U-factor. This Public Comment corrects the over sight by correcting the U-factor to be consistent with the action taken in Climate Zone 6 of CE99 while leaving the corresponding R-value to be consistent with the 2012 IECC.

In cold climates (e.g. Climate Zone 5 and Marine 4) midrise residential multi-family buildings are using wood framing. Four-story and above multi-family buildings have heating and cooling load patterns consistent with low-rise residential construction and require higher insulation levels to reduce heat loss in the evenings and early morning hours when the buildings are typically occupied. Higher levels of insulation are also warranted because Group R buildings have lower internal gains and are envelope dominated verses other commercial buildings that have greater internal gains and require less insulation in the building envelope.

Public Comment 4:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of CE99. This proposal increases the U-factor and reduces efficiency in climate zones 6 and 8. We do not support backsliding on the energy efficiency requirements of the code, particularly without a compelling justification.

The committee admitted that adoption of this proposal would reduce stringency, but it excused this backslide on the basis that the changes "would appear to be a minor reduction in stringency in the colder climates." While we oppose any reduction, even a small one, we disagree with the conclusion that the reduction would be "minor" – we estimate that the new values would constitute an increase in the opaque wall U-factor (and commensurate decrease in opaque envelope efficiency) by roughly 10% in climate zone 6 and 30% in climate zone 8.

The calculated U-factors are inconsistent. While the existing values match the R-Value and U-factor based on standard framing envelope calculations (i.e. R-13 + R7.5CI = 0.051 U-factor), the new values do not use the same calculation methodology and therefore are not consistent with the rest of the table (i.e. R-13 + R6.5CI = 0.054 U factor, not 0.056 U-factor). This calculation discrepancy further weakens the performance path requirements without justification.

Additionally, the inclusion of a single R-Value of R-28 in climate zones 7 and 8 is a loophole that is the least energy efficient option in both climate zones, further weakening buildings that use the prescriptive path. In other words, in climate zone 8 the 2012 IECC is a 0.036 U-factor while this R-28 loophole is a 0.050 U-factor without specifying the required wall thickness or framing type, which is approximately 38% less efficient opaque envelope than the 2012 IECC.

Moreover, while proponent attempts to justify the change by comparing the values for wood-framing with the values applicable to other types of construction, the numbers do not support the proponents' claim. The opaque U-factors in the commercial code currently vary for each construction type (consistent with ASHRAE practice), not just for wood-framing, yet the proponent only addresses one set of values. Moreover, the values as proposed are less stringent than for some other types of construction, which seems inconsistent with the justification for the change.

CE99-13

Final Action: AS AM AMPC____ D

CE100-13
Table C402.1.2

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	~~F-0.70~~ F-1.020	~~F-0.70~~ F-1.020	~~F-0.70~~ F-1.020	~~F-0.70~~ F-1.020	~~F-0.70~~ F-0.900	~~F-0.70~~ F-0.900	~~F-0.65~~ F-0.860	~~F-0.65~~ F-0.860	~~F-0.65~~ F-0.079	~~F-0.65~~ F-0.079	~~F-0.58~~ F-0.079	~~F-0.58~~ F-0.688	~~F-0.55~~ F-0.688	~~F-0.55~~ F-0.688	~~F-0.55~~ F-0.688	~~F-0.55~~ F-0.688

a. Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.
b. Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The IECC F-factors are outdated and need to be improved. The F-factors for heated slabs in Table C402.1.2 are proposed to be revised to align with those in Tables 5.5-1 through 5.5-8 of ASHRAE 90.1-2010.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. As the maximum F-values are revised higher, which means that less insulation is required, this proposal will decrease the cost of construction.

C402.1.2T #3-EC-THOMPSON-SEHPCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Heated slabs	F-0.860	F-0.860	~~F-0.079~~ F-0.790	~~F-0.079~~ F-0.790	~~F-0.079~~ F-0.688	F-0.688	F-0.688	F-0.688	F-0.688	F-0.688

(Portions of proposal not shown remain unchanged)

Committee Reason: The proposal was modified to correct the value in 3 cells which were errors identified in the original submittal by the proponent. The values are coordinated with ASHRAE 90.1. Existing values don't reflect the current values in the R-value table, which aren't being changed. The proposal corrects the F-factors to align with current R-values.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Disapproval.

Commenter's Reason: The original CE100 proposal changes F-factors for heated slabs (i.e., slabs with heating systems in the slab) such that sub-slab insulation would no longer be required in the IECC. This is not an acceptable minimum practice with heated slabs for a number of reasons and, therefore, the proposal should be disapproved rather than adopt potential heated slab performance problems based on actions taken in ASHRAE 90.1. Ideally, a combination of perimeter insulation and full sub-slab insulation is necessary for proper application and use of in-slab heating systems. The reasons this proposal is not acceptable include:

1. There is a huge thermal mass within the ground below slabs. In the first year or so of building operation, tremendous energy waste will occur in changing the thermal equilibrium of the underlying earth. This wasted energy will occur seasonally if the ground temperature is not maintained or periodically if the building heating is turned-off or set back.
2. The slab itself provides sufficient thermal mass (and sometimes too much for responsive space heating control). Adding the additional thermal mass of the underlying earth (by not requiring sub slab insulation as a result of the proposed F-factor changes to ASHRAE 90.1 levels) will create problems in indoor temperature control.
3. The proposal is setting up builders, designers, manufacturers, and installers of in-slab heating systems for call-backs and owner complaints.
4. Heated slabs are an "upgrade" heating option over unheated slabs and should have insulation packages that are commensurate with this intent and market expectation**.**

CE100-13
Final Action: AS AM AMPC____ D

CE102-13
Table C402.1.2, Table C402.2

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**	**All other**	**Group R**
Roofs																
Insulation entirely above deck	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings[d]	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other[c]	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal building[d]	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed[f]	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other[e]	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, Below Grade																
Below-grade wall[b]	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/Framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033 [e]	U-0.033	U-0.033 [e]	U-0.033[e]	U-0.033[e]
Slab-on-Grade Floor																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55

a. ~~Use of~~ Prescriptive opaque assembly *U*-factors, *C*-factors, and *F*-factors from ASHRAE 90.1 Appendix A shall be permitted to be used to show evidence of compliance with this table, provided the construction complies with the applicable construction details, including insulation component thermal requirements, from ASHRAE 90.1 Appendix A.
b. Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.
c. Attic insulation and all other types of roof insulation other than above deck or metal building insulation.
d. Metal skin and steel-framed structural system wherein the insulation, other than continuous insulation, is often compressed at the areas between the structural members and the metal skin.
e. Wood light framed walls and all other wall systems except mass walls, metal building walls and metal framed walls.
f. Light framed walls where the insulation, other than continuous insulation, is installed in the cavity between metal framing members.

TABLE ~~C402.2~~ C402.1.1
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM R-VALUE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation Entirely Above Roof Deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal Buildings (with R-5 thermal blocks)[~~a,~~b]	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-25 + R11 LS	R-25 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS
Attic and other[a]	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, Above Grade																
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building[b]	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed[f]	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other[e]	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 +3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
Walls, Below Grade																
Below Grade Wall[d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R- 12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist / Framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30[e]	R-30	R-30[e]	R-30[e]	R-30[e]
Slab on Grade Floor																
Unheated Slabs	NR	NR	NR	NR	NR	NR	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-20 for 24 in. below
Heated Slabs	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 36 in. below	R-15 for 36 in. below	R-15 for 36 in. below	R-20 for 48 in. below	R-20 for 24 in below	R-20 for 48 in below	R-20 for 48 in below	R-20 for 48 in below
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or Sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm   ci = Continuous insulation.   NR = No requirement.
LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. ~~Assembly descriptions can be found in ASHRAE 90.1 Appendix A.~~ "Attic and other" is attic insulation and all other types of roof insulation other than above deck or metal building insulation.
b. Buildings that incorporate a metal skin and steel-framed structural system wherein the insulation is often compressed between the skin and framing members. Where using the *R*-value compliance method, a thermal spacer block is required between the skin and framing members, otherwise use the assembly *U*-factor compliance method in Section C402.1.2 and Table C402.1.2.
c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in./h-f^2 F.
d. Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.
e. Wood light framed walls and all other wall systems except mass walls, metal building walls and metal framed walls.
f. Light framed walls where the insulation, other than continuous insulation, is installed in the cavity between metal framing members~~.~~

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal clarifies the code and increases its usability with regard to Tables C402.1.2 and C402.2 and the code's prescriptive building thermal envelope provisions. It does not contain technical changes. Most of these changes clarify the relationship between the tables and ASHRAE 90.1 Appendix A, eliminate the need to go to ASHRAE Appendix A, or add missing information regarding how ASHRAE 90.1 Appendix A is to be used when it is necessary to use it. An effort was also made to coordinate the footnotes between Tables C402.1.2 and C402.2.

Detailed reasons for this proposal are as follows:

1) Table C402.1.2:
   - **a.** Revised Footnote a: The existing language indicates that ASHRAE 90.1 Appendix A is permitted to be used, but it does not state what it is to be used for. This proposal clarifies that the purpose is to "show evidence of compliance with this table" and that the design must then also comply with Appendix A "insulation component thermal requirements."
   - **b.** Footnote b: unchanged
   - **c.** Proposed new Footnote c: This new footnote indicates what "Attic and other" is intended to apply to as used in the table, which is "insulation other than above deck or metal building insulation ." Members of SEHPCAC subgroup working on this proposal verified this information with Steve Ferguson of ASHRAE. This information is necessary as building officials have reported that many users call and ask what "Attic and other" is.
   - **d.** Proposed new Footnote d: This footnote describes what the term "Metal buildings" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.
   - e. New Footnote e: This new footnote clarifies that the term "Wood framed and other," as used in the table, "are wood framed walls and all other wall systems except mass walls, metal building walls and metal framed walls." There is much confusion in the field as to how this term is to be interpreted.
   - f. Proposed new Footnote f: This new footnote describes what the term "Metal framed walls" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.
2) Table C402.2:
   - a. Revised Footnote a: Rather than forcing the user to go to ASHRAE 90.1 for a description of assemblies, the footnotes have been revised to include the necessary descriptions. Footnote a in particular now describes the term ""Attic and other" as used in the table, which is "insulation other than above deck or metal building insulation." Members of SEHPCAC subgroup working on this proposal verified this information with Steve Ferguson of ASHRAE. This information is needed as building officials have reported that many users call and ask what "Attic and other" is.
   - **b.** Revised Footnote b: In addition to retaining the information related to "spacer blocks," this footnote now also describes what the term "Metal buildings" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.
   - c. Footnote c: unchanged
   - **d.** Footnote d: unchanged
   - e. New Footnote e: Identical to proposed Footnote e to Table C402.1.2, this new footnote clarifies that the term "Wood framed and other," as used in the table, "are wood framed walls and all other wall systems except mass walls, metal building walls and metal framed walls." There is much confusion in the field as to how this term is to be interpreted.
   - f. Proposed new Footnote f: Identical to proposed Footnote f to Table C402.1.2, this new footnote describes what the term "Metal framed walls" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.

g. Note that, although some of the new footnotes proposed are definitions, and definitions typically belong in Chapter 2, since these definitions pertain only to the these terms as used in this table (they are not used elsewhere in the code), their proper place is as footnotes to the table.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C402.1.2T #5-EC-THOMPSON-SEHPCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The text of the footnotes could change how the tables are used.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Submitted.

Commenter's Reason: In light of the Commercial IECC Development Committee reason for disapproval of this proposal, the SEHPCAC reviewed the footnotes proposed in this change. We feel that footnotes only add clarity to the application of the table and they don't change the intent or application of the table. .

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE102-13

Final Action: AS AM AMPC____ D

CE106-13
Table C402.2, C402.2.3

<u>Proposed Change as Submitted</u>

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Walls, Above Grade																
Mass[f, g]	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other[f]	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 +3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
Walls, Below Grade																
Below Grade Wall[d, f]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.
LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.
c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. Steel floor joist systems shall be insulated to R-38.
<u>f. The R-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.2.</u>
<u>g. “Mass walls” shall include walls weighing not less than:</u>
<u>1. 35 psf (170 kg/m^2) of wall surface area; or</u>
<u>2. 25 psf (120 kg/m^2) of wall surface area where the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m^3).</u>

~~**C402.2.3 Thermal resistance of above-grade walls.** The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.~~

~~"Mass walls" shall include walls weighing not less than:~~

1. ~~35 psf (170 kg/m^2) of wall surface area; or~~
2. ~~25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m^3).~~

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

a) The first sentence in Section C402.2.3 is unnecessary as it is redundant with the requirements of Section C402.1.1 and Table C402.2. It appears to be there only to tie these provisions to Section C402.1.1. Thus, it is better to simply relocate these provisions in Section C402.1.1. The current scenario also creates a condition wherein these redundant requirements could unintentionally diverge in the future.
b) The second sentence and the "Mass wall" criteria in Section C402.2.3 are directly related to Table C402.1.1 and, therefore, are more appropriately located as footnotes to the table. While using the table in its current form (without these proposed footnotes), it is difficult to tell that these provisions are relevant to it.
c) As currently organized, it is not apparent to users as they apply Tables C402.1.1 and C402.2 that Section C402.2.3 is applicable to the tables. This change makes the application more obvious and, therefore, will increase compliance.
d) Note that the requirements of Section C402.2.3 are being moved, not deleted.
e) Note that the provisions of C402.2.3 that are being moved are not requirements, they simply indicate how the term "mass walls" is intended to be applied in the tables.

The SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C402.2T-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides clarification of the code by moving key text into a footnote format of the table. The change does not change any technical standards. The action is a companion piece to CE96-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment 1:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC; requests Disapproval.

Commenter's Reason: It has long been understood that each component in both the residential and commercial tables have their own text section to go with them. The code tells us in Section 401.2 Application, that you have to comply with the listed code sections, not just the tables. In fact, it doesn't even reference the tables directly; the individual code sections reference the tables, not vice versa. We aren't supposed to find code requirements in the footnotes; they are in those specific sections. The footnotes are supposed to be used to just call out or clarify small items within the table.

Every code cycle we try to take code language out of the footnotes and keep them in the text sections so that the footnotes remain understandable. This proposal removes the verbiage in the actual code text dealing with Mass Walls and puts it in the footnote, making a long footnote without much justification for doing it. Does it really make it more understandable by it being in a long footnote than being in the body of the code? A better use of this footnote might be to reference back to Section C402.2.3, where the reader could find all of the requirements for mass walls if they felt there was confusion dealing with those requirements. However, then we would set a precedence for referring the reader to the associated text when we don't do that for any of the other components in any of the tables.

We would ask for disapproval of this proposal because we do not feel as though it has made the code any better as it pertains to understanding the requirements for Mass Walls.

Public Comment 2:

Martha VanGeem, representing self, requests Disapproval.

Commenter's Reason: Adding the text from Section 402.2.3 to a footnote in the table will create too many unnecessary footnotes to the table, especially when combined with other proposals such as CE96 that take text and add it as footnotes to the table.

Also, the footnote is only added to Table C402.2 and not Table C402.1.2. This could create confusion because mass wall criteria are also specified in C402.1.2. The defining terminology for mass walls should remain in Section 402.2.3 because it is used in more than one place; it is used in the two tables.

CE106-13

Final Action: AS AM AMPC____ D

CE107-13
Table C402.2

Proposed Change as Submitted

Proponent: Mark Nowak, M. Nowak Consulting, LLC, representing Steel Framing Alliance

Revise as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2	
	All other	**Group R**	**All other**	**Group R**
Walls, Above Grade				
Metal Framed	R-13~~+5ci~~	R-13~~+5ci~~	R-13~~+5ci~~	R-13~~+ 7.5 ci~~
Wood framed and other	R-13~~+3.8 or R-20~~	R-13+~~3.8 or R-20~~	R-13~~+3.8 or R-20~~	R-13+~~3.8 or R-20~~

(Portions of Table not shown remain unchanged)

Reason: The addition of continuous insulation for Climate Zones 1 and 2 in the 2009 and 2012 code resulted in significant construction costs but little energy savings. Further, in these warmer climates, the embodied energy to manufacture and ship the continuous insulation requires years of the annual projected savings before any real energy savings occurs. Energy conservation could be better accomplished in other areas of the building where more energy could be conserved for each dollar invested.

Following is an analysis of Group R construction that was conducted in various cities from Climate Zones 1 and 2. The data shows the costs and benefits associated with specifying a metal framed wall with and without continuous insulation. The selected cities are the representative cities developed by the US Department of Energy's Pacific Northwest National Laboratory (PNNL) for these respective climate zones. Based on this analysis, which shows simple paybacks from 30 to 102 years, there is not sufficient justification to retain the insulation requirements at the current levels.

Climate zone	City	Building energy use with R-13 exterior walls (kWh)	Building energy use with R13+5 exterior walls (kWh)	Building Energy with R13+7.5 (kWh)	Annual energy savings with addition of continuous insulation (kWh)/$	Cost of continuous insulation per building ($)	Payback in years
1	Miami	373033	371739	-	1294/$138	14032	102
2	Houston	389323	-	384992	4331/$537	16533	31
2	Phoenix	384175	-	380105	4070/$472	16533	35

Table Notes: Energy use was determined through simulations with Energy Gauge Summit V4.10 for a four story 32 unit multi-family apartment based on minimum prescriptive and equipment requirements in the 2012 IECC. Energy costs are as reported year end 2011 by USEIA for the largest utility providers in each city. Insulation costs are national averages from Craftsman Estimator 2007 adjusted for inflation and contractor overhead and profit.

In addition to the lengthy payback periods in these climate zones, the consideration of embodied energy needs to be addressed. The table below shows the embodied energy impact on the overall payback period. In Phoenix and Houston, it will take approximately 7 years before any overall energy will be saved compared to a wall without continuous insulation. The payback for embodied energy increases to 15 years in Miami. When added to the payback for first costs, this will put the overall payback period between 42 and 117 years for the cities in these climate zones, well outside accepted norms.

Climate zone	City	Embodied energy for R-5 continuous insulation (kWh)	Embodied energy for R-7.5 continuous insulation (kWh))	Annual energy savings with addition of continuous insulation (kWh)	Years to payback embodied energy
1	Miami	19388	-	1294	15
2	Houston	-	29030	4331	6.7
2	Phoenix	-	29030	4070	7.1

Table notes: Embodied energy information based on 1.87 kWh per SF or R-5 insulation. Source of embodied energy data extracted from Environmental Building News (Wilson 2010 downloaded from http://www2.buildinggreen.com/blogs/avoiding-global-warming-impact-insulation on December 4, 2012)

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

C402.2T-EC-NOWAK.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt that there are multiple methods to meet the performance levels and simply eliminating the continuous insulation sets up a discrepancy between the R-values and the U-factors.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table C402.1.2
Opaque Thermal Envelope Assembly Requirements

Climate Zone	1		2	
	All other	Group R	All other	Group R
Walls, Above Grade				
Metal Framed	U=~~0.077~~ 0.124	U=~~0.077~~ 0.124	U=~~0.077~~ 0.124	U=~~0.064~~ 0.124
Wood framed and other	U=~~0.064~~ 0.089	U=~~0.064~~ 0.089	U=~~0.064~~ 0.089	U=~~0.064~~ 0.089

(Portions of Table not shown remain unchanged)
(*Portions of original proposal not shown remain unchanged)*

Commenter's Reason: During the initial public hearings, objections were raised that the proposed changes to the R-values in Table C402.2 would create a conflict because the proposal did not address the corresponding U-factors. This modification brings the U-factors into alignment with the proposed R-values in Table C402.2. The U-factors are those from the same table as published in the 2009 IECC for R-13+0 insulation in wood and steel framed walls. They also match the U-factors in Table A.3.3 of Appendix A in ASHRAE 90.1-2010 for wall cavities with R-13+0 insulation.

The addition of continuous insulation for Climate Zones 1 and 2 in the 2009 and 2012 code resulted in significant construction costs but little energy savings. Further, in these warmer climates, the embodied energy to manufacture and ship the continuous insulation requires years of the annual projected savings before any real energy savings occurs. Energy conservation could be better accomplished in other areas of the building where more energy could be conserved for each dollar invested.

Following is an analysis of Group R construction that was conducted in various cities from Climate Zones 1 and 2. The data shows the costs and benefits associated with specifying a metal framed wall with and without continuous insulation. The selected cities are the representative cities developed by the US Department of Energy's Pacific Northwest National Laboratory (PNNL) for these respective climate zones. Based on this analysis, which shows simple paybacks from 30 to 102 years, there is not sufficient justification to retain the insulation requirements at the current levels.

Climate zone	City	Building energy use with R-13 exterior walls (kWh)	Building energy use with R13+5 exterior walls (kWh)	Building Energy with R13+7.5 (kWh)	Annual energy savings with addition of continuous insulation (kWh)/$	Cost of continuous insulation per building ($)	Payback in years
1	Miami	373033	371739	-	1294/$138	14032	102
2	Houston	389323	-	384992	4331/$537	16533	31
2	Phoenix	384175	-	380105	4070/$472	16533	35

Table Notes: Energy use was determined through simulations with Energy Gauge Summit V4.10 for a four story 32 unit multi-family apartment based on minimum prescriptive and equipment requirements in the 2012 IECC. Energy costs are as reported year end 2011 by USEIA for the largest utility providers in each city. Insulation costs are national averages from Craftsman Estimator 2007 adjusted for inflation and contractor overhead and profit.

In addition to the lengthy payback periods in these climate zones, the consideration of embodied energy needs to be addressed. The table below shows the embodied energy impact on the overall payback period. In Phoenix and Houston, it will take approximately 7 years before any overall energy will be saved compared to a wall without continuous insulation. The payback for embodied energy increases to 15 years in Miami. When added to the payback for first costs, this will put the overall payback period between 42 and 117 years for the cities in these climate zones, well outside accepted norms.

Climate zone	City	Embodied energy for R-5 continuous insulation (kWh)	Embodied energy for R-7.5 continuous insulation (kWh))	Annual energy savings with addition of continuous insulation (kWh)	Years to payback embodied energy
1	Miami	19388	-	1294	15
2	Houston	-	29030	4331	6.7
2	Phoenix	-	29030	4070	7.1

Table notes: Embodied energy information based on 1.87 kWh per SF or R-5 insulation. Source of embodied energy data extracted from Environmental Building News (Wilson 2010 downloaded from http://www2.buildinggreen.com/blogs/avoiding-global-warming-impact-insulation on December 4, 2012)

CE107-13

Final Action: AS AM AMPC____ D

CE108-13
Table C402.2

Proposed Change as Submitted

Proponent: Larry Williams, Steel Framing Industry Association

Revise as follows:

Table C402.2
Opaque thermal Envelope requirements

Climate Zone	3	
	All other	**Group R**
	Walls, above grade	
Metal Framed	R-13~~+7.5ci~~	R-13~~+7.5ci~~
Wood framed and other	R-13~~+3.8 or R-20~~	R-13+~~3.8 or R-20~~

(Portions of Table not shown remain unchanged)

Reason: The addition of continuous insulation for Climate Zone 3 in 2009 and its further increase in the 2012 code resulted in significant construction costs but little energy savings. Further, the embodied energy to manufacture and ship the continuous insulation requires years of the annual projected savings before any real energy savings occurs. Energy conservation could be better accomplished in other areas of the building where more energy could be conserved for each dollar invested.

Following is an analysis of Group R construction that was conducted in various cities from Climate Zone 3. The data shows the costs and benefits associated with specifying a metal framed wall with and without continuous insulation. The selected cities are the representative cities developed by the US Department of Energy's Pacific Northwest National Laboratory (PNNL) for this climate zone. Based on this analysis, which shows simple paybacks from 23 to 25-1/2 years, there is not sufficient justification to retain the insulation requirements at the current levels.

Climate zone	*City*	*Building energy use with R-13 exterior walls (kWh)*	*Building Energy with R13+7.5 (kWh)*	*Annual energy savings with addition of continuous insulation (kWh)/$*	*Cost of continuous insulation per building ($)*	*Payback in years*
3	*El Paso*	*399359*	*393888*	*5471/$649*	*16533*	*25.5*
3	*San Francisco*	*355492*	*351170*	*4322/$662*	*16533*	*25*
3	*Memphis*	*439907*	*432413*	*7494/$718*	*16533*	*23*

Table Notes: Energy use was determined through simulations with Energy Gauge Summit V4.10 for a four story 32 unit multi-family apartment based on minimum prescriptive and equipment requirements in the 2012 IECC. Energy costs are as reported year end 2011 by US EIA for the largest utility providers in each city. Insulation costs are national averages from Craftsman Estimator 2007 adjusted for inflation and contractor overhead and profit.

In addition to the lengthy payback period in these climate zones for first costs, the consideration of embodied energy needs to be addressed. The table below shows the embodied energy payback periods. The embodied energy increases payback by approximately 4 to just under 7 additional years. When added to the payback for first costs, this will put the overall payback period between approximately 27 and 32 years, well outside accepted norms.

Climate zone	*City*	*Embodied energy for R-7.5 continuous insulation (kWh))*	*Annual energy savings with addition of continuous insulation (kWh)*	*Years to payback embodied energy*
1	*El Paso*	*29030*	*5471*	*5.3*
2	*San Francisco*	*29030*	*4322*	*6.7*
2	*Memphis*	*29030*	*7494*	*3.9*

Table notes: Embodied energy information based on 1.87 kWh per SF or R-5 insulation. Source of embodied energy data extracted from Environmental Building News (Wilson 2010, downloaded from http://www2.buildinggreen.com/blogs/avoiding-global-warming-impact-insulation on December 4, 2012)

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

C402.2T-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Consistent with the disapproval of CE107-13, the committee found that this proposal would also reduce R-values in even colder climate zones than addressed in CE107.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table C402.1.2
Opaque Thermal Envelope Assembly Requirements

Climate Zone	**3**	
	All other	**Group R**
	Walls, above grade	
Metal Framed	U=~~0.064~~ 0.124	U=~~0.064~~ 0.124
Wood framed and other	U=~~0.064~~ 0.089	U=~~0.064~~ 0.089

(Portions of code change proposal and Table not shown remain unchanged)

Commenter's Reason: This modification brings the U-factors into alignment with the proposed R-values in Table C402.2. The proposed U-factors are taken from Table A.3.3 of Appendix A in ASHRAE 90.1-2010 for wall cavities with R-13+0 insulation.

The addition of continuous insulation for Climate Zone 3 in 2009 and its further increase in the 2012 code resulted in significant construction costs but little energy savings. Further, the embodied energy to manufacture and ship the continuous insulation requires years of the annual projected savings before any real energy savings occurs. Energy conservation could be better accomplished in other areas of the building where more energy could be conserved for each dollar invested.

Following is an analysis of Group R construction that was conducted in various cities from Climate Zone 3. The data shows the costs and benefits associated with specifying a metal framed wall with and without continuous insulation. The selected cities are the representative cities developed by the US Department of Energy's Pacific Northwest National Laboratory (PNNL) for this climate zone. Based on this analysis, which shows simple paybacks from 23 to 25-1/2 years, there is not sufficient justification to retain the insulation requirements at the current levels.

Climate zone	*City*	*Building energy use with R-13 exterior walls (kWh)*	*Building Energy with R13+7.5 (kWh)*	*Annual energy savings with addition of continuous insulation (kWh)/$*	*Cost of continuous insulation per building ($)*	*Payback in years*
3	*El Paso*	*399359*	*393888*	*5471/$649*	*16533*	*25.5*
3	*San Francisco*	*355492*	*351170*	*4322/$662*	*16533*	*25*
3	*Memphis*	*439907*	*432413*	*7494/$718*	*16533*	*23*

Table Notes: Energy use was determined through simulations with Energy Gauge Summit V4.10 for a four story 32 unit multi-family apartment based on minimum prescriptive and equipment requirements in the 2012 IECC. Energy costs are as reported year end 2011 by US EIA for the largest utility providers in each city. Insulation costs are national averages from Craftsman Estimator 2007 adjusted for inflation and contractor overhead and profit.

In addition to the lengthy payback period in these climate zones for first costs, the consideration of embodied energy needs to be addressed. The table below shows the embodied energy payback periods. The embodied energy increases payback by approximately 4 to just under 7 additional years. When added to the payback for first costs, this will put the overall payback period between approximately 27 and 32 years, well outside accepted norms.

Climate zone	*City*	*Embodied energy for R-7.5 continuous insulation (kWh))*	*Annual energy savings with addition of continuous insulation (kWh)*	*Years to payback embodied energy*
1	*El Paso*	*29030*	*5471*	*5.3*
2	*San Francisco*	*29030*	*4322*	*6.7*
2	*Memphis*	*29030*	*7494*	*3.9*

Table notes: Embodied energy information based on 1.87 kWh per SF or R-5 insulation. Source of embodied energy data extracted from Environmental Building News (Wilson 2010, downloaded from http://www2.buildinggreen.com/blogs/avoiding-global-warming-impact-insulation on December 4, 2012)

CE108-13

Final Action: AS AM AMPC____ D

CE110-13
Table C402.2

Proposed Change as Submitted

Proponent: Mark Halverson, APA-The Engineered Wood Association (mark.halverson@apawood.org), Paul Coats, The American Wood Council

Revise as follows:

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R13 + 13ci	R-13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 19.5ci	R13 + 13ci	R13 + 19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + 7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R15.6 ci	R-13 + R-7.5ci	R-13 + R17.5 ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R3.8~~7.5~~ci or R20 ~~+R3.8 ci~~	R13 + R7.5ci or R20 +R3.8 ci	R13 + R7.5ci or R20 +R3.8 ci	R13 + R7.5ci or R20 +R3.8 ci	R13 + R7.5ci or R20 +R3.8 ci	R13 + R15.6 ci or R20 +R10ci	R13 + R15.6 ci or R20 +R10ci

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. Steel floor joist systems shall be insulated to R-38.

(Portions of Table not shown remain unchanged)

Reason: The above-grade wall *U*-factors and the insulation requirements for Climate Zone 5 and Marine 4 in Tables C402.1.2 and C402.2 are in alignment, except for the *R*-value requirements for Group R buildings. This proposal simply brings those insulation values into alignment with the other *R*-values and *U*-factors for the climate zone. Since each of the other climate zones have consistent wood frame wall *R*-values and *U*-factors for "Group R" buildings and "All Other" buildings, it only makes sense to correct the inconsistency found in this cell in Table C402.2.

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

C402.2T-EC-COATS-HALVERSON.doc

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The proposal aligns the R-value and U-factor for this cell of the tables.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Walls, Above Grade																
CLIMATE ZONE	**1**		**2**		**3**		**4 EXCEPT MARINE**		**5 AND MARINE 4**		**6**		**7**		**8**	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R13 + 13ci	R-13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 19.5ci	R13 + 13ci	R13 + 19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + 7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R15.6ci	R-13 + R-7.5ci	R-13 + R17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R~~3.8~~7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8c	R13 + R7.5ci or R20 +R3.8ci	R13 + R7.5ci or R20 +R3.8ci	R13 + R15.6ci or R20 +R10ci	R13 + R15.6ci or R20 +R10c

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a] CLIMATE ZONE

Walls, Above Grade																
CLIMATE ZONE	**1**		**2**		**3**		**4 EXCEPT MARINE**		**5 AND MARINE 4**		**6**		**7**		**8**	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal buildings	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.052	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-~~0.064~~ <u>0.051</u>	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036

Commenter's Reason: During the development of the envelope provisions for the 2012 IECC commercial code, the wood framed wall R-values for Climate Zone 5 and Marine 4 for Group R were modified without modifying the corresponding U-factor in Table C402.1.2. This over site by the proponents of the code change proposal created an inconsistency between the R-value requirements in Table C402.2 and the U-factor requirements in Table C402.1.2. Several of the U-factors that were used to populate Table C402.1.2 came directly from ASHRAE 90.1-2010 in addition to the corresponding R-values. In this case the R-value requirement of R-13 + R-7.5ci was brought over but not the corresponding U-factor. This Public Comment corrects the over sight by correcting the U-factor while leaving the corresponding R-value to be consistent with the 2012 IECC.
In cold climates (e.g. Climate Zone 5 and Marine 4) midrise residential multi-family buildings are using wood framing. Four-story and above multi-family buildings have heating and cooling load patterns consistent with lowrise residential construction and require higher insulation levels to reduce heat loss in the evenings and early morning hours when the buildings are typically occupied. Higher levels of insulation are also warranted because Group R buildings have lower internal gains and are envelope dominated verses other commercial buildings that have greater internal gains and require less insulation in the building envelope.

Public Comment 2:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council requests Disapproval.

Commenter's Reason: This PC requests disapproval on the basis that a public comment submitted for CE99-13 (by this PC proponent) does a better job of addressing this concern. See the public comment on CE99-13 and its reason statement for the rationale.

Public Comment 3:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of CE110. This proposal decreases the R-Value and reduces efficiency in climate zone 5. We do not support backsliding on the energy efficiency requirements of the code, particularly without a compelling justification.

In addition to reducing the energy efficiency of buildings in climate zone 5 compared to the 2012 IECC, this proposal also goes counter to ASHRAE 90.1 addendum bb which recommends the original R-Values (R-13+7.5) and the corresponding correct U-factor (0.051) for Climate Zone 5. The proper "correction" for the climate zone 5 wood framed wall can be found in both CE-89 and CE-90.

CE110-13

Final Action: AS AM AMPC____ D

CE116-13
C402.2.1.1

Proposed Change as Submitted

Proponent: Amy Dickie, Global Cool Cities Alliance (amy@globalcoolcities.org)

Revise as follows:

C402.2.1.1 Roof solar reflectance and thermal emittance. Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, ~~and~~ 3, 4a and 4b, shall comply with one or more of the options in Table C402.2.1.1.

(Portions of text not shown remains unchanged)

Reason: Cool roofs are cost effective in climate zones 4a and 4b. Currently, the cool roof provision applies only to climate zones 1 through 3. This proposal expands the cool roof provision to climate zones 4a and 4b, where there is overwhelming evidence that cool roofs provide consistent and significant energy savings and energy cost savings.

Roofs that have a high solar reflectance and high thermal emittance (cool roofs) stay cooler in the sun. Cool roofs will have multiple benefits in climate zones 4a and 4b.

- Switching to cool roofs across climate zones 4a and 4b generates energy savings and energy cost savings.
- Cool roofs help reduce peak load in IECC climate zones 4a and 4b.
- The benefits of cool roofs have been proven beneficial in major metropolitan areas within climate zones 4a and 4b. Several major cities in climate zone 4 have adopted the use of cool roofs on commercial, low-sloped roofs into law.
- Cool roofs provide a cooler environment for roof equipment, thus enabling better performance for rooftop equipment.
- In many cases roof construction can have a cool roof option with zero price premium. Some cool roofs have small price premiums.
- Cool roofs have many important co-benefits. For example, a large number of cool roofs will reduce the summer air temperature in cities and therefore improve resiliency of urban populations to heat events.

The following technical analyses and substantiating information supports this proposal.

1) **Switching to cool roofs across IECC Climate Zones 4a and 4b generates energy savings and energy cost savings.**
   a. Cool roofs have a positive net energy savings in most parts of the country (Figure 1) and net energy cost savings in most parts of the country (Figure 2).[1]

Figure 1: Cooling energy savings and heating energy penalty for commercial buildings with low-sloped roofs that have installed cool roofs. Calculations are based on increasing the aged solar reflectance of the roof to 0.55 from 0.20. Data from Levinson and Akbari (2010). Btu conversions added by GCCA. Annual net energy savings = annual cooling energy savings – heating energy penalty. *Values for other climate zones are available in the Levinson and Akbari (2010) paper.*

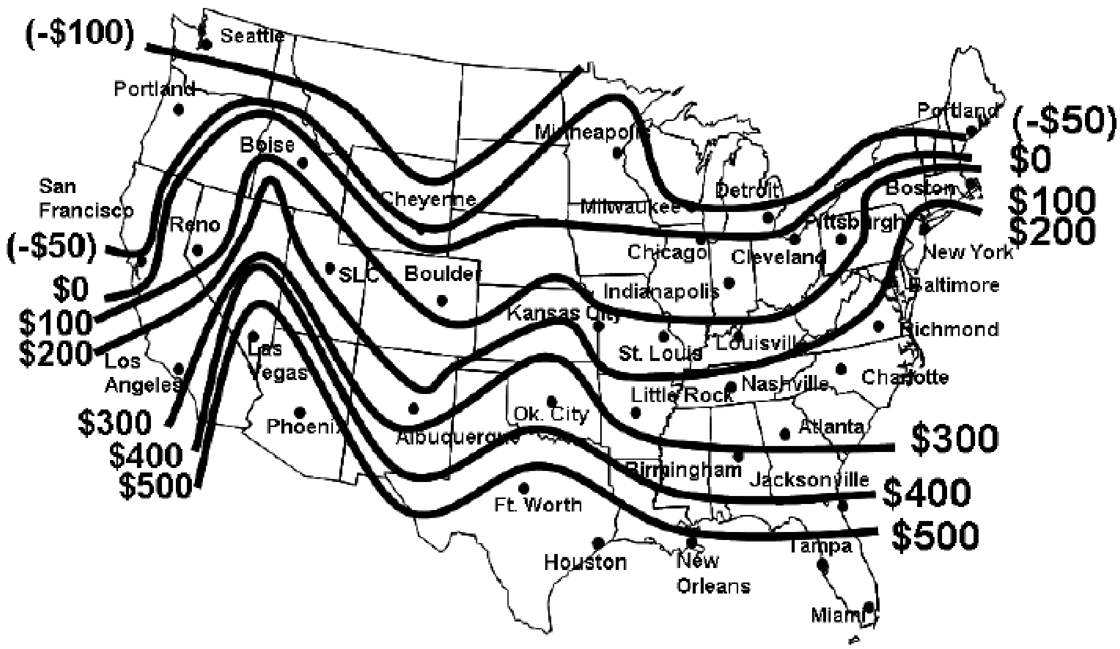
DOE benchmark city	State	Climate Zone	new office annual cooling-energy savings (Btu/m^2)	new office annual heating-energy penalty (Btu/m^2)	new office annual net energy savings (Btu/m^2)
Baltimore	MD	4A	7,034	4,766	2,268
Albuquerque	NM	4B	10,084	4,714	5,370

Figure 2: Net energy cost savings for commercial buildings with low-sloped roofs that have installed cool roofs. Calculations are based on increasing the aged solar reflectance of the roof to 0.55 from 0.20. Data from Levinson and Akbari (2010) with updated energy prices from EIA 2010.*Values for other climate zones are available upon request by e-mail.*

DOE benchmark cities	State	Climate Zone	new office annual energy-cost saving ($/ft^2)	new retail annual energy-cost saving ($/ft^2)
Baltimore	MD	4A	$ 0.01	$ 0.02
Albuquerque	NM	4B	$ 0.02	$ 0.03

   b. The breakeven line for cool roofs is well north of climate zones 4a and 4b.

   Figure 3: Net Annual Energy Cost Savings for a reflective roof versus a non-reflective roof (dollars per 20,000 square foot roof area) for low-sloped commercial buildings. Calculations were made using the DOE Cool Roof Calculator.[2]



2) **Cool roofs help reduce peak load in IECC Climate Zones 4a and 4b.**
   a. According to a recent study, peak energy savings from cool roofs are significant in all climate zones.[3]
   b. According to an analysis conducted for the Environmental Protection Agency[4], adopting cool roofs across 11 metropolitan areas generates peak energy savings for all of them. The three cities included in the study from climate zone 4a had peak annual energy savings from commercial buildings as follows:
   New York – 95 MW
   Philadelphia – 49 MW
   DC/Baltimore – 31 MW
3) **The benefits of cool roofs have been proven beneficial in major metropolitan areas within climate zones 4a and 4b. Several major cities in climate zone 4 have adopted the use of cool roofs on commercial, low-sloped roofs into law.**
   a. A study that analyzed temperature data collected from three different roof surface treatments in Long Island City, Queens, New York found that the white roof surfaces did not show any "winter heating penalty" relative to the black roofs, and found that white roofs generate an energy cost savings of approximately $200 per year.[5]
   b. A study which analyzed the building energy impacts of the use of light colored roofs across the US found net energy cost savings for commercial buildings in all eleven of the metropolitan areas it analyzed.[6] GCCA updated this analysis using EIA electricity and natural gas data from 2010. See Figure 4, below.
   Figure 4: Annual energy savings and energy cost savings per 1,000 square feet of roof area of air conditioned commercial buildings resulting from the application of light colored roofs. Building energy data from Konopacki et al. Energy cost data from EIA 2010.

Metropolitan Area	Annual Savings on Commercial Buildings					
	Climate Zone	electricity (kWh)	gas (therms)	electricity savings ($)	heating energy penalty ($)	net energy savings ($)
Atlanta	3A	239	-6	21.65	-6.57	15.08
Chicago	5A	228	-15	20.25	-13.14	7.11
Los Angeles	3B	350	-3	45.85	-2.49	43.36
Dallas / Forth Worth	3A	224	-4	20.59	-3.16	17.43
Houston	2A	261	-2	23.99	-1.58	22.41
Miami/ Ft. Lauderdale	1A	340	0	33.18	0	33.18
New Orleans	2A	287	-2	24.4	-1.97	22.43
New York	4A	211	-9	34.41	-9.79	24.62
Philadelphia	4A	232	-14	23.43	-14.66	8.77
Phoenix	2B	409	-2	38.73	-2.14	36.59
DC/Baltimore	4A	221	-9	29.66	-11.03	18.63

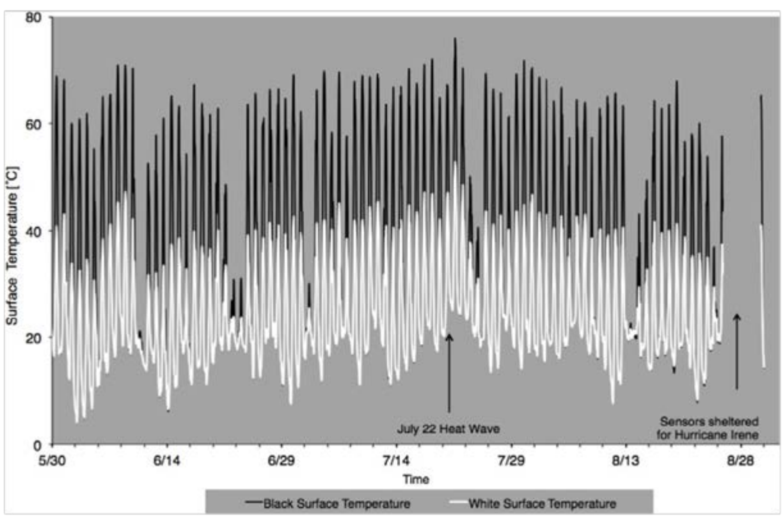
c. New York, Philadelphia, and Washington DC all require cool roofs. All of these cities are in climate zone 4. In all cases, these ordinances were adopted in an effort to generate building energy savings and mitigate the urban heat island.

- As of January 2012, New York City requires cool roofs on new and replacement low-sloped roofs (Local Laws of the City of New York for the Year 2011, #21). Roofs must have a minimum initial reflectance of 0.7 and initial thermal emittance of 0.75 or an SRI of 78.
- Washington DC's Construction Code of 2008 for commercial buildings includes a provision on cool roofs in Chapter 15A. Low-sloped roofs are required to have a minimum initial SRI of 78 or comply with Energy Star. In December 2012, the Washington DC Department of Consumer and Regulatory Affairs and the Construction Codes Coordinating Board published a proposed rulemaking to adopt IECC 2012 section C402.2.1.1 with an amendment to include climate zone 4.
- In April, 2010, the City of Philadelphia issued an ordinance (#090923) that all low-sloped roofs on new buildings and additions to existing buildings be Energy Star rated as highly reflective.

4) Cool roofs provide a cooler environment for roof equipment

a. Cool roofs lead to less thermal expansion due to their cooler temperatures.[7]

Figure 5: White and black roof temperatures on a building in New York City through the summer of 2011.[7]



5) **In many cases roof construction can have a cool roof option with zero price premium. Some cool roofs have small price premiums.**

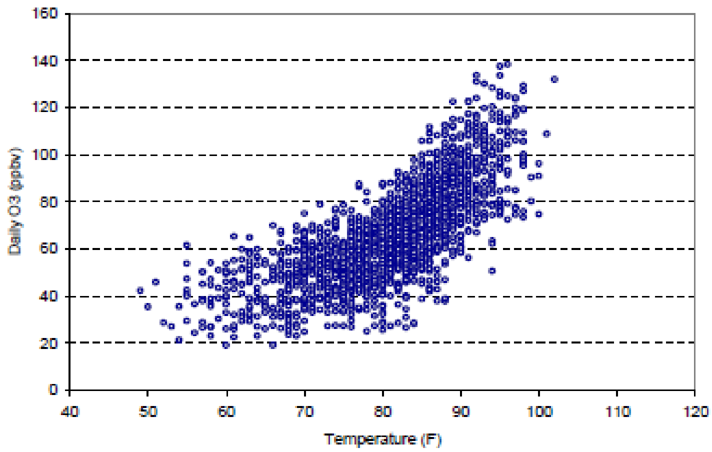
a. As with most construction materials, pricing can vary by market. According to EPA's Cool Roof website states, the cost premium for cool roofs versus conventional roofing materials ranges from zero to 5 or 10 cents per square foot for most products.[8]

6) Cool roofs provide co-benefits beyond building energy efficiency

a. Cool roofs help reduce ambient air temperatures, which in turn lower the incidences of smog formation.[9]

Figure 6 shows that as the surface temperature at Baltimore Washington International Airport (x-axis) rises, peak 8-hour ozone concentrations (y-axis) rise at an accelerated pace. Plots above horizontal red line indicate readings that exceeded the EPA compliance standard.

Figure 6: Maximum surface temperature at BWI versus peak 8-hour ozone concentrations



b. Cool roofs improve resiliency of urban populations to heat events.

A report for the Environmental Protection Agency studied the estimated mortality attributed to actual extreme heat events in Detroit, Philadelphia, Los Angeles, and New Orleans. Scenarios where the cities had higher albedos (10% improvements and 20% improvements) and greater vegetative cover suggest reductions in mortality during extreme heat events when cool surfaces are used to reduce urban temperatures. The paper models three multi-day heat events in Philadelphia (Climate Zone 4a) and estimated a reduction in mortality of approximately 5.5% as a result of a 10% improvement in urban reflectivity.[10]

References:

1) Ronnen Levinson and Hashem Akbari, "Potential benefits of cool roofs on commercial buildings," *Energy Efficiency* (2010) 3:53-109.
2) Hoff, J. L. (2005). The Economics of Cool Roofing: A local and regional approach. *Proceedings of Cool Roofing: Cutting through the Glare*, Atlanta, Georgia, May 2005.
3) Hoff, J. L. (2012) An outcome-based, multi-variate approach to roof surface thermal contribution. *Proceedings of the International Roof Coatings Conference*, Baltimore, MD, July 2012.
4) Konopacki et al., "Cooling Energy Savings Potential of Light-Colored Roofs for Residential and Commercial Buildings in 11 U.S. Metropolitan Areas", a report prepared for the Environmental Protection Agency, 1997.
5) Gaffin, S.R., Rosenzweig, C., Eichenbaum-Pikser, J., Khanbilvardi, R. and Susca, T., 2010. "A Temperature and Seasonal Energy Analysis of Green, White, and Black Roofs" Columbia University, Center for Climatic Systems Research. New York.
6) Konopacki et al., "Cooling Energy Savings Potential of Light-Colored Roofs for Residential and Commercial Buildings in 11 U.S. Metropolitan Areas", a report prepared for the Environmental Protection Agency, 1997.
7) Gaffin et al., "Bright is the New Black" Environmental Research Letters 7 (2012).
8) http://www.epa.gov/hiri/mitigation/coolroofs.htm
9) Russell Dickerson et al., "Climate Change and Air Quality for Baltimore and Washington," a contribution to ACCENT CCAQ: Group 1 (2007).
10) Kalkstein and Sheridan, "The Heat Impact of Heat Island Reduction Strategies on Health-Debilitating Oppressive Air Masses in Urban Areas" a report for the EPA, 2003.

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

C402.2.1.1-EC-DICKIE.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was opposed to this increase in stringency represented by adding Climate Zone 4 to this requirement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Amy Dickie, Global Cool Cities Alliance, requests Approval as Submitted

Commenter's Reason: The Committee opposed the addition of Climate Zones 4a and 4b to the current 'cool roof' requirement in section C402.2.1.1. We maintain that expanding the existing cool roof requirements into Climate Zones 4a and 4b is a beneficial change for the IECC for the following reasons:

1) Cool roofs are already in wide use in the commercial market in Climate Zones 4a and 4b, and even farther north. They are eminently feasible, and several large jurisdictions in these regions already require the use of cool roofs. New York, Philadelphia, and Washington DC all require cool roofs on low-sloped commercial buildings. In June, Pittsburgh (Climate Zone 5a) established a program that will install cool roofs on several city buildings.
2) Cool roofs provide short or even immediate payback periods in Climate Zones 4a and 4b.
3) This proposal maintains sufficient design flexibility in the code.

As this Hearing is being held in Climate Zone 4a, we believe the Assembly should have the opportunity to debate CE116.

CE116-13
Final Action: AS AM AMPC____ D

CE118-13
C202 (NEW), C402.2.1.1

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.1.1 Roof solar reflectance and thermal emittance. Low sloped roofs~~, with a slope less than 2 units vertical in 12 units horizontal,~~ directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.

> **Exceptions:** The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:
>
> 1. Portions of roofs that include or are covered by:
>   1.1. Photovoltaic systems or components.
>   1.2. Solar air or water heating systems or components.
>   1.3. Roof gardens or landscaped roofs.
>   1.4. Above-roof decks or walkways.
>   1.5. Skylights.
>   1.6. HVAC systems, components, and other opaque objects mounted above the roof.
> 2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
> 3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m^2) or 23 psf (117 kg/m^2) pavers.
> 4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.

Add new definition as follows:

<u>**LOW SLOPED ROOF.** A roof having a slope less than 2 units vertical in 12 units horizontal.</u>

Reason: This proposal simplifies criteria for low sloped roofs by adding a definition for the term "low slope roof." The current code text includes within it a definition that might be better placed in the definitions section of the code. Alternatively, if this is the only place the term is used, the need for a definition is moot if the text is then revised as "Roofs with a slope less than 2 units vertical in 12 units horizontal directly above…."

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

C402.2.1.1-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds a welcome definition and should eliminate confusion between the IECC and the *International Residential Code* regarding low sloped roofs.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Amy Dickie, Global Cool Cities Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

LOW SLOPED ROOF. A roof having a slope less than <u>or equal to</u> 2 units vertical in 12 units horizontal.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This modification to the definition of low sloped roof makes it consistent with the definition in CE 122 which was approved as submitted by the Committee. We are in favor of moving the definition into the definitions section of the code.

CE118-13
Final Action: AS AM AMPC____ D

CE121-13

Table C402.2.1.1, C402.1.1.1 (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Robert A. Zabcik, P.E., NCI Building Systems, Inc., representing Cool Metal Roofing Coaliton

Revise as follows:

TABLE C402.2.1.1
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

Three-year aged solar reflectance[b] of 0.55 and three-year aged thermal emittance[c] of 0.75
~~Initial solar reflectance[b] of 0.70 and initial thermal emittance[c] of 0.75~~
Three-year-aged solar reflectance index[d] of 64
~~Initial solar reflectance index[d] of 82~~

a. The use of area-weighted averages to meet these requirements shall be permitted. ~~Materials lacking initial tested values for either solar reflectance or thermal emittance, shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90.~~ Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned ~~both~~ a three-year aged solar reflectance in accordance with Section C402.2.1.1.1 ~~of 0.10~~ and a three-year aged thermal emittance of 0.90.

b. Aged s~~S~~olar reflectance tested in accordance with CRRC-1~~ASTM C 1549, ASTM E 903or ASTM E 1918~~.

c. Aged t~~T~~hermal emittance tested in accordance with CRRC-1~~ASTM C 1371 or ASTM E408~~.

d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h × ft2 ×°F (12W/m^2 × K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. ~~Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.~~

C402.2.1.1.1 Aged roof solar reflectance. Where an aged solar reflectance required by Section C402.2.1.1 is not available, it shall be determined in accordance with Equation 4-X.

$R_{aged} = [0.2+0.7(R_{initial}-0.2)]$ (Equation 4-X)

where:

R_{aged} = The aged solar reflectance

$R_{initial}$ = The initial solar reflectance determined in accordance with CRRC-1

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison St
Oakland, CA 94612

CRRC-1 2012 Cool Roof Rating Council, CRRC-1 Standard

Reason: The use of initial values for compliance with solar reflectance (SR) and thermal emittance (TE) requirements as opposed to three-year aged values is not representative of real-word conditions. Weathering of most roofing materials greatly changes the SR and to a lesser degree, the TE, as documented by Lawrence Berkeley and Oak Ridge National Laboratories. The California Energy Commission (CEC) Title 24 Building Energy Efficiency Standards has addressed this issue very effectively since 2005. By requiring 3-year aged SR and TE values, a more realistic SRI is obtained; one that represents the performance of the roofing material during the life of the material rather than at the time of installation. The Cool Roof Rating Council (CRRC) has simultaneously developed the CRRC-1 standard to rigorously qualify the test procedures used to measure SR and TE, as well as the aging process. Thus, referencing the CRRC-1 standard is much more thorough than simply referencing the ASTM test methods used to measure SR and TE directly. The CRRC has recently been ANSI accredited to develop standards, further adding credibility.

The CRRC-1 standard uses the same test methods as the 2012 IECC, with the exception of ASTM E 408, which measures direct normal TE using a handheld device. (ASTM C 1371 measures the TE averaged over a hemisphere and the two methods can yield greatly different results.) Energy Star has recently dropped ASTM E408 as well. Furthermore, the test procedures are further qualified to ensure consistency across all tested roofing products, including variegated products such as granule coated shingles.

The aging process has absolutely no qualification as currently specified in the IECC. The CRRC-1 Standard very effectively addresses this gap as well by specifying multiple test farms sites and accrediting labs to age and test specimens for SR and TE. It also outlines a color family program that allows manufacturers of colored products to group and test their products in representative lots. The downside is that the aging process takes three years. However, the CEC has included the aging formula presented in proposed new Section C402.2.1.1.1 since 2005 to predict aged values, which is also introduced in this proposal to provide values to use before testing is completed. This formula is based on a curve fit of the CRRC dataset and provides aged values of SR with conservatism and accuracy.

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

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C402.2.1.1T-EC-ZABEIK.doc

Committee Action Hearing Results

For staff analysis of the content of ANSI/CRRC-1-2012 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Approved as Modified

Modify the proposal as follows:

b. Aged solar reflectance tested in accordance with ASTM C 1549, ASTM E 903, ASTM E 1918 or CRRC-1.
c. Aged thermal emittance tested in accordance with ASTM C 1371, ASTM E 408 or CRRC-1.

(Portions of proposal not shown remain unchanged)

Committee Reason: The modification retains the existing testing standards so that products which had been tested under them don't need to be retested under CRRC-1. The proposal was accepted by the committee as providing a method by which aged solar reflectance can be determined where testing hasn't been completed. The proposal is a compatible addition to the revision to the section approved in CE122-13.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert A. Zabcik, P.E., NCI Building Systems, Inc., representing Cool Metal Roofing Coalition, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

TABLE C402.2.1.1
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

Three-year aged solar reflectance[~~b~~] of 0.55 and three-year aged thermal emittance[~~c~~] of 0.75
Three-year-aged solar reflectance index[~~d~~b] of 64

a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned a three-year aged solar reflectance in accordance with Section C402.2.1.1.1 and a three-year aged thermal emittance ~~of 0.90~~in accordance with C402.2.1.1.2.
~~b. Aged solar reflectance tested in accordance with CRRC-1, ASTM C 1549, ASTM E 903 or ASTM E 1918.~~
~~c. Aged thermal emittance tested in accordance with CRRC-1, ASTM C 1371 or ASTM E 408.~~
~~d.~~b. Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h × ft^2 ×°F (12 W/m^2 × K).

C402.2.1.1.1 Aged roof solar reflectance. Aged solar reflectance shall be determined in accordance with CRRC-1 Standard. Alternatively, solar reflectance shall be permitted to be determined by ASTM C 1549, ASTM E 903 or ASTM E 1918 when conducted on samples aged for at least three years in accordance with an accepted national standard on test farms accredited by a nationally recognized program in at least three different climates: Hot/Humid, Cold/Temperate and Hot/Dry, as described in the CRRC-1 Standard. Where an aged solar reflectance required by Section C402.2.1.1 is not available, it shall be determined in accordance with Equation 4-X.

$R_{aged} = [0.2+0.7(R_{initial}-0.2)]$ (Equation 4-X)

where:

R_{aged} = The aged solar reflectance
$R_{initial}$ = The initial solar reflectance determined in accordance with CRRC-1, ASTM C 1549, ASTM E 903 or ASTM E 1918.

C402.2.1.1.2 Aged thermal emittance. Aged thermal emittance shall be determined in accordance with CRRC-1 Standard. Alternatively, thermal emittance shall be permitted to be determined in accordance with ASTM C 1371 or ASTM E 408 when conducted on samples aged for at least three years in accordance with an accepted national standard on test farms accredited by a nationally recognized program in at least three different climates: Hot/Humid, Cold/Temperate and Hot/Dry as described in the CRRC-1 Standard. Where an aged thermal emittance required by Section C402.2.1.1 is not available, it shall be assigned a value of 0.90.

Commenter's Reason: The re-inclusion of the ASTM standards for determination of solar reflectance and thermal emittance from the original CE 121, which contained a reference to CRRC-1 only, has introduced discrepancies that this comment intends to correct. While ASTM C 1549, ASTM E 903 and ASTM E 1918 are the same test methods that the CRRC-1 Standard utilizes for solar reflectance, CRRC-1 also includes extensive detail on the aging process itself, which if a user elects to test to the ASTM standards directly, will not be passed through. The same situation exists with thermal emittance as well.

Without the changes identified in this comment, the only requirements for aging are the words "three-year aged", which alone do not provide a sufficient level of detail to ensure the solar reflectance and thermal emittance values to be consistent throughout all products regardless of compliance path. As is, the alternate compliance path the code is providing lacks any information on the following:

- Mounting configuration
- Exposure conditions
- Identification of climates for purposes of consistent aging
- Required number of test farms to be used
- Required number of samples to be aged and tested

The proposed changes address all of these points and provide the minimal level of detail that will make the alternate compliance path consistent with the CRRC-1 Standard. This will provide a consistent set of requirements while still allowing more than a single compliance path.

CE121-13
Final Action: AS AM AMPC____ D

CE122-13

C402.2.1.1, C402.2.1.1.1 (NEW), C402.2.1.2 (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Amy Dickie, Global Cool Cities Alliance (amy@globalcoolcities.org), Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Delete and substitute as follows:

~~**C402.2.1.1 Roof solar reflectance and thermal emittance.** Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.~~

~~**Exceptions:** The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:~~

1. ~~Portions of roofs that include or are covered by:~~
   ~~1.1. Photovoltaic systems or components.~~
   ~~1.2. Solar air or water heating systems or components.~~
   ~~1.3. Roof gardens or landscaped roofs.~~
   ~~1.4. Above-roof decks or walkways.~~
   ~~1.5. Skylights.~~
   ~~1.6. HVAC systems, components, and other opaque objects mounted above the roof.~~
2. ~~Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.~~
3. ~~Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m2) or 23 psf (117 kg/m2) pavers.~~
4. ~~Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.~~

C402.2.1.1 Roof solar reflectance and thermal emittance. In climate zones 1, 2 and 3, roofs with a slope less than or equal to 2 units vertical in 12 units horizontal that are located directly above cooled conditions spaces shall have an average aged solar reflectance of not less than 0.55 and an average aged thermal emittance of not less than 0.75.

Exceptions: The following roofs and portions of roofs are exempt from the requirements in this Section:

1. Portions of the roof that include or are covered by the following:
   1.1. Photovoltaic systems or components
   1.2. Solar air or water heating systems or components
   1.3. Roof gardens or landscaped roofs
   1.4. Above-roof decks or walkways
   1.5. Skylights
   1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of the roof shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (lb/ft^2) [74 kg/m^2] or 23 psf (lb/ft^2) [117 kg/m^2] pavers.
4. Roofs where a minimum of 75 percent of the roof area meets one or more of the exceptions above.

C402.2.1.1.1 Alternative Compliance Pathways. Roofs or portions of roofs that comply with one or more of the following also shall be in compliance with C402.2.1.1.

1. An aged solar reflectance index of not less than 64.
2. An initial solar reflectance of not less than 0.70 and an initial thermal emittance of not less than 0.75.
3. An initial solar reflectance index of not less than 82.

C402.2.1.2 Roof testing. Roof product solar reflectance and thermal emittance shall be determined as follows:

1. The initial and aged solar reflectances and initial and aged thermal emittances of the roofing product shall be measured in accordance with the ANSI/CRRC-1 Standard.
2. Initial and aged values of solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a medium wind speed convective coefficient of 2.1 BTU/(h · ft^2 · °F) [12 W/(m^2 · K)]. Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.
3. Materials lacking initial tested values for either solar reflectance or thermal emittance shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking aged tested values for either solar reflectance or thermal emittance shall be assigned both an aged solar reflectance of 0.10 and an aged thermal emittance of 0.90.

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison Street
Oakland, CA 94612

CRRC-1-12 – CRRC-1 Standard

Reason: The 2012 IECC is the first I-code to contain substantive language for 'cool roofs'. This proposal makes technical corrections, reformats, and adds clarity to the language in Section C402.2.1.1, and adds a reference to the CRRC standard. Descriptions of specific changes and the reasons for each are described below.

1) Problem: The definition for low-sloped roofs is inconsistent with other major codes and standards, including ASHRAE and California's Title 24.
Solution: Change the definition of low-sloped roofs from a rise to run ratio of less than 2:12 to a rise to run ratio of less than or equal to 2:12. This change makes the definition of low-sloped roofs consistent with other codes (e.g. ASHRAE 90.1 and California's Title 24).
2) Problem: The code does not make clear which performance metric is preferred.
Solution: Reformat the code to state primary rating option (aged solar reflectance and aged thermal emittance) in the body of the code and the other rating options as exceptions. Note that although this change alters the format of the code, it has no influence on the stringency of the code.
3) Problem: The "three-year" specification is redundant to "aged". Further, future versions of the CRRC-1 Standard may allow a different time period for aged testing.
Solution: Remove the specification of "three-year" from the notation of aged reflectivity and aged emissivity values because the duration of the aging is explicit in the CRRC Standard, and should be changed as the standard evolves.
4) Problem: Important definitions and requirements for roof testing are included in footnotes and are therefore confusing and difficult to follow.
Solution: Move the footnotes that pertain to the testing requirements into a new section (Section C402.2.1.3), titled "Roof Testing". This change moves important definitions and requirements out of the footnotes, thus providing a cleaner format for the code.
5) Problem: The ANSI approval for the CRRC-1 Standard as a consensus standard had not been received at the time of the final action hearing of the last code cycle. Therefore, the code does not reference the most appropriate industry standard for roof testing and aging.
Solution: The CRRC-1 Standard is now an ANSI approved consensus standard. This code change references what most stakeholders consider to be the most appropriate standard, which now complies with ICC CP-28.

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

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C402.2.1.1(NEW)-EC-CONNER-DICKIE.doc

Committee Action Hearing Results

For staff analysis of the content of ANSI/CRRC-1-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Approved as Submitted

Committee Reason: The committee was concerned, based on testimony that key technical issues were not addressed in the proposal and that some existing products could be put at a disadvantage. The proposal was approved based on it being a good reorganization of the requirements in a concise, readable format as well and because it added the CRRC1 standard.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Amy Dickie, Global Cool Cities Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~Table C402.2.1.1~~
~~MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]~~

~~Three-year aged solar reflectance[b] of 0.55 and three-year aged thermal emittance of 0.75.~~
~~Initial solar reflectance of 0.70 and initial thermal emittance[c] of 0.75.~~
~~Three-year aged solar reflectance index[d] of 64.~~
~~Initial solar reflectance index of 82.~~

~~a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either solar reflectance or thermal emittance, shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned both a three-year aged solar reflectance of 0.10 and a three-year aged thermal emittance of 0.90.~~
~~b. Solar reflectance tested in accordance with ASTM C 1549, ASTM E 903 or ASTM E 1918.~~
~~c. Thermal emittance tested in accordance with ASTM C 1371 or ASTM E 408.~~
~~d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft^2 x F (12W/m^2 x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.~~

(The portions of the proposal not shown remain unchanged)

Commenter's Reason: This comment strikes out Table C402.2.1.1 which was left orphaned after CE122 was approved at the Committee Hearings in Dallas. We intended to remove the table with our proposal, but failed to include the strike out in our initial proposal. This comment rectifies this problem. It makes no other changes to CE122.

Public Comment 2:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Disapproval.

Commenter's Reason: The approval of CE122 introduces a problem into the code. The text of CE122 eliminates all reference to Table C402.2.1.1. This would create an orphan table, the use of which would be unclear for the code user. We understand it is the intent of the proponents of CE121 and CE122 to submit public comments to address the merger of their two code change proposals, but to also address the status of the table. If their public comments to amend the proposals are successful, the SEHPCAC will not pursue disapproval. But without some action to address the orphan table, the SEHPCAC will seek disapproval in order to restore the existing text and its reference to Table C402.2.1.1.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE122-13

Final Action: AS AM AMPC____ D

CE124-13
C202 (New), C402.2.2, C402.2.2.1, C402.2.2.2

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Delete without substitution as follows:

~~**C402.2.2 Classification of walls.** Walls associated with the building envelope shall be classified in accordance with Section C402.2.2.1 or C402.2.2.2.~~

~~**C402.2.2.1 Above-grade walls.** Above-grade walls are those walls covered by Section C402.2.3 on the exterior~~
~~of the building and completely above grade or walls that are more than 15 percent above grade.~~

~~**C402.2.2.2 Below-grade walls.** Below-grade walls covered by Section C402.2.4 are basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.~~

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15 percent above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the building that is part of the *building thermal envelope* , is at least 85 percent below grade and is on the exterior of the building.

Reason: In order to clarify and simplify the code, this proposal replaces the current text indicating how to determine a wall classification with a formal definition of each wall type

Section C402.2.2 contains only definitions that are more appropriately located in Section C202. Application of the current Sections C402.2.3 (above grade walls) and C402.2.4 (below grade walls) are clear as to requirements and can be readily and more easily applied by locating the definitions of those terms in the definitions section as opposed to another section of the code.

The current code provisions are technically incorrect. They refer to the building envelope (not the defined term building thermal envelope) and the exterior of the building. This omits any wall that is an interior wall that is part of the building thermal envelope, which is where the heat transfer occurs that the code is intending to address. Examples of this are a stairway wall separating an unconditioned basement from a conditioned first floor or a wall separating a conditioned basement from a vented crawl space. A strict application of the current code would eliminate such walls from having to be insulated because they are neither on the building exterior nor associated with the building envelope. The proposed definitions, therefore, cover all possible walls that could be part of the building thermal envelope (those bounded completely or partially by earth, those exposed to the outdoor elements and not bounded by earth, and those separating conditioned from unconditioned or exempt spaces regardless of location in relation to grade) in a clearer manner.

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

C402.2.2-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: As with CE123-13, the committee is concerned that the existing definitions of above grade wall and basement wall and introduction of these two new definitions will result in confusion in application of the code. While the committee did approve a modification to remove the definition of Above Grade Wall, in the end there remained unresolved issues.

Assembly Action: **Approved as Modified**

Modify the proposal as follows:

~~**ABOVE-GRADE WALL.** A wall more than 50 percent above grade and enclosing conditioned space. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.~~

(Portions of proposal not shown remain unchanged)

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified and because public comments were received.

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION C202
GENERAL DEFINITIONS

~~**ABOVE-GRADE WALL.** A wall more than 50 percent above grade and enclosing conditioned space. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.~~

~~**BASEMENT WALL.** A wall 50 percent or more below grade and enclosing conditioned space.~~

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15% above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the building that is part of the *building thermal envelope*, is at least 85% below grade and is on the exterior of the building.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: At the code development hearing, it was noted that the current code has a conflict wherein the definitions of above grade wall and basement wall, and the provisions in Sections C402.2.2.1 and C402.2.2.2 treat walls differently. The former being a 50/50 threshold, and the latter two being a 15/85 threshold. In addition, and more importantly, the former do not clearly indicate how a wall below grade and not on the building exterior but which is part of the building thermal envelope (e.g. interior wall in a basement separating a conditioned basement from a vented crawl space) is to be classified. It was noted that the intent was to also delete the current definitions of above-grade wall and basement wall, and a floor modification to do that was approved for consideration and voted for by the committee 6-3.

During testimony on the change, there were questions about the 15/85 threshold and disagreement that a wall that might be over 15% above grade but less than 50% above grade would or should be considered an above grade wall. While this might be, it remains that the code currently delineates above and below grade walls based on more than 15% above grade in Sections C402.2.2.1 and C402.2.2.2. So whether the issue of above and below grade walls is covered in the code text or a definition as proposed in CE124-13, any concern associated with a 50/50 versus 15/85 threshold is not related to this code change proposal but would require a change in the current code. This change simply proposes to put what are definitions in the definitions section, as opposed to having them located within the technical requirements of the code. It is important to note that the term 'basement wall' appears outside Chapter 2 of the IECC Commercial provisions (definitions) only once – in Section C303.2.1 where referring to protecting insulation on the exterior of basement walls – a likely unintended carryover from the separation of residential and commercial building provisions in the 2012 edition, where basement walls is used and applied to residential buildings. The thermal criteria in Chapter 4 of the IECC Commercial Provisions consistently refer to walls above-grade and walls-below grade and never use the term basement wall.

This change is simply about correcting a significant conflict within the code that is causing confusion. The existence of two conflicting ways to designate above and below grade walls and basement walls can be traced back to the prior editions of the IECC, where the commercial section (Chapter 5) had the 15/85 threshold covered in the text of the code, and the definitions of above-grade wall and basement wall were in the definitions section; intending to apply to the residential provisions of the IECC in Chapter 4. When the residential and commercial provisions were fully separated in the 2012 IECC the definitions of above-grade wall and basement wall and the 50/50 threshold associated with them was carried forward in error. In short – whether this code change proposal is approved as modified or not, the code will still have a 15/85 and 50/50 issue. The code change proposal, as modified and approved with a floor vote of 30-16 at least makes the following improvements, which are not covered in the current code:

- clarifies this conflicting percentage of wall issue for commercial buildings,

- confirms that the threshold is 15/85,
- confirms that the proper place to address that is as a definition, and
- provides specific direction for interior walls that separate conditioned and unconditioned space and are below grade but not on the building exterior,

In disapproving the change, the committee expressed concern about resulting confusion in the application of the code. The code change **as modified** removes any confusion, because it (1) removes terms that are not needed and not used in a relevant manner in the IECC Commercial Provisions, and (2) defines terms that are used identical to how they are "defined" in the body of the code. If anything, the current code is confusing as noted above by having the definition of above grade wall and basement, and then not using those terms in a relevant manner. It is further confusing by including conflicting criteria defining above and below grade walls in the body of the code. In recommending disapproval, the committee noted there were unresolved issues in the proposal. The only remaining unresolved issue is the removal of the term basement wall in the definitions section, which is addressed by this public comment.

Also of relevance, there were three other code change proposals submitted that relate to these definitions; all of which were recommended for disapproval. CE45-13 would retain the current definitions of above-grade wall and basement wall but change the 50/50 threshold to 15/85. This would ensure the consistency of the definitions to the criteria in C402.2.2.1 and C402.2.2.2 but could still result in confusion given the terms are then essentially defined in both Section C202 and those sections. CE123-13, if approved, as submitted would have the same result as the approval of CE124-13 as modified by this public comment. CE125-13 would not address this issue, as the definitions in Section C202 for above-grade wall and basement wall would be retained and the conflict would remain.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Public Comment 2:

Don Surrena, CBO, National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

WALL, ABOVE-GRADE. A wall with the *building thermal* envelope that is more than ~~15~~ 50 percent above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building.

WALL, BELOW-GRADE. A wall with the *basement or first story of the building that is part of the building thermal envelope,* is at least ~~85~~ 50 percent below grade and is on the exterior of the building.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: These modifications create a consistency between the commercial and residential definitions of above grade and below grade / basement walls. The commercial and residential definition of a basement wall is a wall that is more than half below grade. It is much more reasonable to consider a wall that is more than half below grade to be a "below-grade" wall and less than half above grade to be an "above-grade" wall. As it currently stands, the commercial definition of a below grade wall is a wall that is 85% or more below grade. So an eight foot wall that is 81" below grade (15" exposed) is considered an above-grade wall. This change would classify an 8 ft wall 47" below grade as an above grade wall and a wall 49" below grade would be a below grade wall.

CE124-13

Final Action: AS AM AMPC____ D

CE125-13

Table C402.2, C402.2.2, C402.2.2.1, C402.2.2.2, C402.2.3, C402.2.4

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

~~**C402.2.2 Classification of walls.** Walls associated with the building envelope shall be classified in accordance with Section C402.2.2.1 or C402.2.2.2.~~

~~**C402.2.2.1 Above-grade walls.** Above-grade walls are those walls covered by Section C402.2.3 on the exterior of the building and completely above grade or walls that are more than 15 percent above grade.~~

~~**C402.2.2.2 Below-grade walls.** Below-grade walls covered by Section C402.2.4 are basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.~~

C402.2.3 Thermal resistance of ~~above-grade~~ walls <u>more than 15 percent above grade</u>. <u>For exterior walls that are completely above grade or are more than 15 percent above grade,</u> the minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m^2) of wall surface area; or
2. 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m^3).

C402.2.4 Thermal resistance of ~~below-grade~~ walls at <u>least 85 percent below grade</u>. <u>For exterior walls that are at least 85 percent below grade,</u> the minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the ~~below-grade~~ walls shall be as specified in Table C402.2, and shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the floor, whichever is less.

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation Entirely Above <u>Roof</u> Deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal Buildings (with R-5 thermal blocks)[a,b]	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-25 + R11 LS	R-25 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS
Attic and other[a]	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R--49	R-49	R-49	R-49	R-49	R-49	R-49
<u>Exterior</u> Walls~~,~~ <u>completely or</u> <u>more than 15 Percent</u> Above Grade																
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other[f]	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 +3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
<u>Exterior</u> Walls~~,~~ <u>At Least 85 Percent</u> Below Grade																
~~Wall~~ <u>Walls at least 85 percent</u> Below Grade [d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R- 12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist / Framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 [e]	R-30	R-30[e]	R-30 [e]	R-30 [e]
Slab on Grade Floors																
Unheated Slabs	NR	NR	NR	NR	NR	NR	R-10 for 24" in. below	R-10 for 24" in. below	R-10 for 24" in. below	R-10 for 24" in. below	R-10 for 24" in. below	R-15 for 24" in. below	R-15 for 24" in. below	R-15 for 24" in. below	R-15 for 24" in. below	R-20 for 24" in. below
Heated Slabs[d]	R-7.5 for 12" in. below	R-7.5 for 12" in. below	R-7.5 for 12" in. below	R-7.5 for 12" in. below	R-10 for 24" in. below	R-10 for 24" in. below	R-15 for 24" in. below	R-15 for 24" in. below	R-15 for 36" in. below	R-15 for 36" in. below	R-15 for 36" in. below	R-20 for 48" in. below	R-20 for 24" in below	R-20 for 48" in below	R-20 for 48" in below	R-20 for 48" in below
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or Sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.
LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block is required, otherwise use the *U*-factor compliance method in Table C402.1.2.
c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f^2 °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. Steel floor joist systems shall ~~to~~ be insulated to R-38.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

This proposal moves and clarifies, but does not delete the requirements of existing Sections C402.2.2, C402.2.2.1 and C402.2.2.2 of the 2012 IECC.

The code currently has definitions in Chapter 2 for "above-grade" and "basement walls" which conflict with Sections C402.2.1 and C402.2.1, which are also essentially definitions. Furthermore, as Sections 402.2.1 and C402.2.2.2 are not referenced in C402.2.3 and C402.2.4, it is not immediately clear which definitions apply to Sections C402.2.3 and C402.2.4. To eliminate this confusion and add clarity, we propose that the technically important content from Sections C402.2.2.1 and C402.2.2.2 (i.e., percentages above or below grade) be moved into Sections C402.2.3 and C402.2.4, respectively, and that the terms "above grade" and "basement" or "below grade" walls be eliminated. In this manner, confusion is eliminated with other code sections that rely on the Chapter 2 definitions.

Note that the SEHPCAC also submitted a separate proposal to delete Section C402.2.4. This proposal works whether or not that proposal is successful. The committee's preference is that both proposals be approved, resulting in the deletion of Section C402.2.4 and the approval of all other provisions in this proposal.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C402.2.2-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that this did not provide a solution to the issues identified in this proposal as well as CE123-13 and CE124-13. There was concern that moving the text into the table headers was confusing the issue. The committee encouraged the parties to work with SEHPCAC to develop a comprehensive public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.2.3 Thermal resistance of above-grade walls more than 15 percent above grade. For exterior walls that ~~are completely above grade or~~ are more than 15 percent above grade, the minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with
Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m^2) of wall surface area; or

2. 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m^3).

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
Exterior Walls ~~completely or~~ more than 15 Percent Above Grade																
Mass	R-5.7ci[c]	R-5.7ci[c]	R-5.7ci[c]	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other[f]	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 +3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
Exterior Walls~~-~~At Least 85 Percent Below Grade																
Walls at least 85 percent Below Grade[d]	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist / Framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30[e]	R-30	R-30[e]	R-30[e]	R-30[e]

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The SEHPCAC believe that the intent of the original proposal remains valid. The current Section C402.2.2 states that walls associated with the Building Envelop are classified by Sections C402.2.2.1 and C402.2.2.2. These sections establish the 85/15% split in determining when a wall is above or below grade for envelop purposes. Since Table C402.2 establishes the criteria for insulation for walls, the proper application of table C402.2 is based on the 85/15% split. This is a direct application of the code for this requirement and supersedes the 50% established by the definition of above grade walls. The proposed modification removes unnecessary verbiage. A wall this is completely above grade also is one that is at least 15% above grade. 'Completely above' is a redundant criteria.. This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Public Comment 2:

Don Surrena, CBO, National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.2.3 Thermal resistance of walls more than ~~15~~ 50 percent above grade. For exterior walls that are completely above grade or are more than ~~15~~ 50 percent above grade, the minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m^2) of wall surface area; or
2. 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m^3).

C402.2.4 Thermal resistance of walls at least ~~85~~ 50 percent below grade. For exterior walls that are at least ~~85~~ 50 percent below grade, the minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the walls shall be as specified in Table C402.2, and shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the floor, whichever is less.

Commenter's Reason: These modifications create a consistency between the commercial and residential definitions of above grade and below grade basement walls. The commercial and residential definition of a basement wall is a wall that is more than half below grade. It is much more reasonable to consider a wall that is more than half below grade to be a "below-grade" wall and less than half above grade to be an "above-grade" wall. As it currently stands, the commercial definition of a below grade wall is a wall that is 85% or more below grade. So an eight foot wall that is 81" below grade (15" exposed) is considered an above-grade wall. This change would classify an 8 ft wall averaging 47" below grade as an above grade wall and a wall 49" below grade would be a below grade wall.

CE125-13

Final Action:	AS	AM	AMPC____	D

CE127-13, Part I
C402.2.3, R402.2.5 (IRC N1102.2.5)

Proposed Change as Submitted

Proponent: James D. Katsaros, PhD, DuPont Building Innovations (james.d.katsaros@dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

“Mass Walls” shall include walls weighing not less than:

1. 35 psf (170 kg/m^2) of wall surface areas; ~~or~~
2. 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3), <u>or</u>
3. <u>Having a heat capacity greater than or equal to 6 BTU/ft^2 x ^{o}F [123 kJ/m^2 x K].</u>

Reason: This proposal adds a heat capacity provision to mass wall definition to be consistent with IRC definition

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

C402.2.3-EC-KATSARAS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The lead in language is that mass walls are those that weigh a certain amount, but the proposed text is not a measurement of weight. There was concern that the proposal contained the correct factor for the heat capacity. The proposal needs to be reformatted.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Martha VanGeem, representing Masonry Alliance of Codes and Standards; Theresa A. Weston, PhD., DuPont Building Innovations, request Approval as Modified by this Public Comment

Modify the proposal as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass Walls" shall include walls ~~weighing not less than~~:

1. weighing not less than 35 psf (170 kg/m^2) of wall surface areas; or
2. weighing not less than 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3), or
3. having a heat capacity exceeding 7 Btu/ft^2·°F ~~greater than or equal to 6 BTU/ft~~$^{\cancel{2}}$ ~~x~~ $^{\cancel{o}}$~~F~~ [144 ~~123~~ kJ/m^2 x K], or
4. having a heat capacity exceeding 5 Btu/ft^2·°F [103 kJ/m^2 x K], where the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3).

Commenter's Reason:
Van Geem: The energy-saving benefits of thermal mass are not based on the weight of the wall or the heat capacity, but on the thermal diffusivity. It is thermal diffusivity or its combined components of thermal conductivity, specific heat, and density that are entered into simulation software to model thermal mass. A simplification of this to ease code compliance is allowing mass walls to be defined differently for different wall weights (as already in the IECC in items (1) and (2) above) or different heat capacities (as in the code change proposal and this comment). Items (1) and (3) are technically equivalent for mass walls, as are items (2) and (4). This proposal is consistent with the definitions for mass walls used in ASHRAE 90.1.

A paper providing more information has been published on this subject and is available upon request:
VanGeem, M.G., "Optimal Thermal Mass and R-Value in Concrete," First International Conference on Concrete Sustainability, Tokyo, May 2013.

Weston: The original proposal sought to add to the code a better understanding of thermal "mass walls". During the earlier hearings, as was noted in the committee's reason statement, there was a discussion on the correct usage of heat capacity in the determination of a mass wall. The modification corrects the usage of heat capacity and was arrived at after discussion with industry experts. The modification also corrects the formatting issue stated in the committee's comments.

CE127-13, Part I
Final Action: AS AM AMPC____ D

CE127-13, Part II
C402.2.3, R402.2.5 (IRC N1102.2.5)

Proposed Change as Submitted

Proponent: James D. Katsaros, PhD, DuPont Building Innovations (james.d.katsaros@dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R402.2.5 (N1102.2.5) Mass Walls. Mass walls for the purpose of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs, <u>or any other walls having a heat capacity greater than or equal to 6 BTU/ft^{2}x^{o}F) [123 kJ/m^{2}x K].</u>

Reason: This proposal adds a heat capacity provision to mass wall definition to be consistent with IRC definition

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

C402.2.3-EC-KATSARAS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This proposed text defining mass walls is consistent with the IRC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Martha VanGeem, representing Masonry Alliance for Codes and Standards; Theresa A. Weston, PhD. Dupont Building Innovations, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.5 (N1102.2.5) Mass Walls. Mass walls for the purpose of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth), and solid timber/logs~~,~~<u>;</u> or any other walls having a heat capacity greater than~~ or equal to 6 BTU/ft^2 · ºF) [123 kJ/m^2 · K].~~

<u>1. 7 Btu/ft^{2}x°F) [144 KJ/m^{2}xK]; or</u>
<u>2. 5 Btu/ft^2·°F [103 kJ/m^{2}x K], where the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3).</u>

Commenter's Reason:

Van Geem: The energy-saving benefits of thermal mass are not based on the weight of the wall or the heat capacity, but on the thermal diffusivity of the materials. It is thermal diffusivity or its components of thermal conductivity, specific heat, and density that are entered into simulation software to model thermal mass. A simplification of this to ease code compliance is to list the wall types as currently in the IRC. Another simplification is allowing mass walls to be defined differently for different wall heat capacities (as in this code change proposal and this public comment). This proposal is consistent with the definition of mass walls in ASHRAE 90.1.

A paper providing more information has been published on this subject and is available upon request:
VanGeem, M.G., "Optimal Thermal Mass and R-Value in Concrete," First International Conference on Concrete Sustainability, Tokyo, May 2013.

Weston: The original proposal sought to add to the code a better understanding of thermal "mass walls". During the committee hearings, there was a discussion on the correct usage of heat capacity in the determination of a mass wall. The modification corrects the usage of heat capacity and was arrived at after discussion with industry experts.

CE127-13, Part II

Final Action: AS AM AMPC____ D

CE131-13
C402.2.6

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.2.6 Slab~~s~~-on-grade perimeter insulation. Where the slab-on-grade is in contact with the ground**,** the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors designed in accordance with the *R*-value method of Section C402.1.2 shall be as specified in Table C402.2. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

> **Exception:** Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The title of this section is proposed to be revised to clarify that:

a) Section C402.2.6 applies only to the perimeter insulation associated with slab-on-grade construction. This section does not apply to the insulation installed within or immediately above or below and in contact with the slab-on-grade construction.
b) Section C402.2.6 applies only to the R-value method in Section C402.1.1. It does not apply to the U-, C- and F-factor method in Section C402.1.2. (Note the ASHRAE 90.1 prescriptive tables referenced by Table C402.1.2 contain their own perimeter insulation requirements and are not reliant on Table C402.2.)

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C402.2.6-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was found to be confusing, especially the proposed section title. F-factor is not addressed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Submitted.

Commenter's Reason: The Commercial IECC Development Committee was in error in disapproving this proposal. The Committee's reason statement questions why the F-factor was not addressed. The F-Factor is not addressed because this is a section specific to the R-value methodology and the F-factor is irrelevant. The committee also felt the title was confusing. The title is an editorial matter. The SEPHCAC felt that 'Slab-on-grade perimeter insulation' is an apt description of the requirements found in this section. The SEHPCAC stands by its original reason statement submitted with this proposal.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Please note that the original proposal contained a typographical error, the Section reference added should have been shown as C402.1.1 – not C402.1.2.

CE131-13

Final Action: AS AM AMPC____ D

CE136-13
C402.3, C402.3.4 (NEW), Table C402.3.4 (NEW), Table C407.5.1(1)

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with this section, including the prescriptive values in Table C402.3 and Table C402.3.4. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

C402.3.4 Minimum VT. The minimum visible transmittance (VT) for vertical fenestration and skylights in all climate zones shall be as specified in Table C402.3.4.

Exception: Buildings where the vertical fenestration products collectively have an area-weighted average VT equal to or greater than the alternative minimum VT (VT_{alt}) calculated in accordance with Equation C4-3.

$VT_{alt} = 0.11/FWR$ **(Equation C4-3)**

where:

FWR = Fenestration to Wall Ratio which shall be equal to the actual fenestration area of the proposed building divided by the gross above-grade wall area (expressed as a decimal), but shall not exceed the maximum fenestration area as a percent of gross above-grade wall area allowed in Section C402.3.1.

TABLE C402.3.4
FENESTRATION MINIMUM VT

FENESTRATION TYPE	MINIMUM VT
All Climate Zones	
Vertical Fenestration:	
Fixed	0.42
Operable	0.32
Curtain wall/storefront	0.46
Glazed entrance doors	0.17
Skylights	0.49

~~C402.3.4~~ C402.3.5 Area-weighted average *U*-factor and VT. An area-weighted average shall be permitted to satisfy the *U*-factor requirements for each fenestration product category listed in Table C402.3 and the VT requirements for each fenestration product category listed in Table C402.3.4. Individual fenestration products from different fenestration product categories listed in Table C402.3 or Table C402.3.4 shall not be combined in calculating area-weighted average *U*-factor or VT, respectively.

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing	Area 1. The proposed glazing area; where the proposed glazing area is less than 40 percent of above-grade wall area. 2. 40 percent of above-grade wall area; where the proposed glazing area is 40 percent or more of the above-grade wall area.	As proposed
	U-factor: from Table C402.3	As proposed
	SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used	As proposed
	<u>VT: from Table C402.3.4</u>	<u>As proposed</u>
	External shading and PF: None	As proposed
Skylights	Area 1. The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly. 2. 3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly.	As proposed
	U-factor: from Table C402.3	As proposed
	SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used	As proposed
	<u>VT: from Table C402.3.4</u>	<u>As proposed</u>

Reason: The purpose of this proposal is to establish minimum visible transmittance (VT) requirements for commercial fenestration in the *IECC*. This proposal will establish in the *IECC* the same level of minimum VT performance criteria that have been approved and will take effect under California's most recently-revised building energy code, Title 24 *Building Energy Efficiency Standards*, starting in January 2014. The proposal also contains certain provisions, such as weighted averaging and an alternative compliance option based on an equation reflecting fenestration to wall ratio, that were adopted by California to provide flexibility in compliance approaches.

It is well understood that windows are the source of significant solar heat gain, particularly in commercial structures, which have significant internal and external heat gains. Even in colder climates, cooling energy use is typically the most significant load for commercial structures. Due to this fact, most commercial energy codes, including the *IECC*, have appropriately focused on establishing low SHGCs to reduce air conditioning loads, resulting in lower peak energy use and lower electrical peak demand (note that we have another proposal to lower SHGCs in climate zones 4 – 6). Traditional solutions to blocking solar gain sacrificed visible light by allowing the use of dark glazing because of limited glazing options that were available at the time; however, because of technological improvements over the last decade, windows with low SHGC and high VT are now widely available. Thus, this proposal is intended to ensure that reasonable levels of natural light are also available inside the building (or at least that the building capture energy savings associated with such levels) by establishing a minimum VT performance requirement.

Historically, model building codes have required minimum glazing area for these and other reasons. The International Building Code, for example, in Section 1205.2, requires a minimum net glazed area of at least 8% of the floor area of the room served. This is to ensure, among other things, that natural light is provided to spaces intended for human occupancy. However, these values were set based primarily on clear glass, with much higher VTs. In fact, given much lower VTs for fenestration in many commercial buildings, there was a significant debate in the 2012 IECC code cycle over perceived problems to reducing maximum glazing area to 30% in the prescriptive path based on the perceived need for more glazing for daylighting. As our nation's energy codes continue to move to implement criteria for reducing unwanted solar heat gain, setting reasonable VT minimums is a simple measure that will ensure that windows perform as intended to provide natural light, while at the same time reduce solar gain. Ideally, energy codes should establish balanced criteria to address SHGC and VT that are designed to ensure that only the part of the sun's energy useful for daylighting enters the building. This proposal is an effort in that direction.

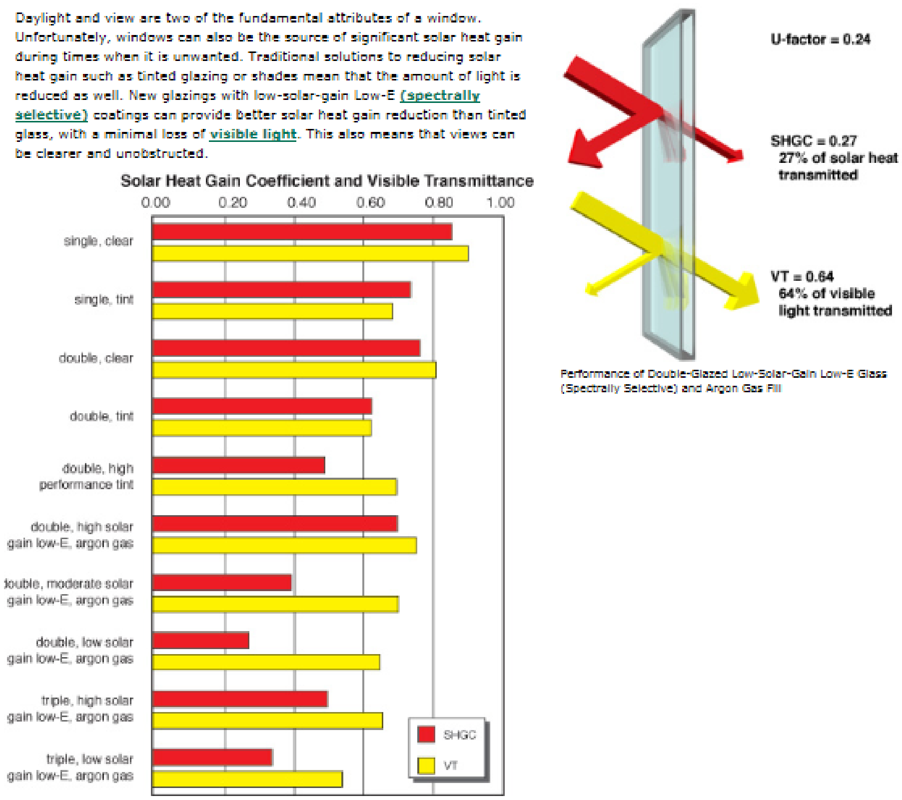
Achieving this balanced glazing performance (between low SHGC and high VT) was a driving force behind California's implementation of minimum VT requirements (at the same time, California set low SHGC requirements statewide). In 2009, California commissioned a series of Codes and Standards Enhancement Initiative ("CASE") studies to identify opportunities for improvements and efficiency in its Title 24 Building Energy Efficiency Standards. One such CASE Study, entitled "Nonresidential and High-Rise Residential Fenestration Requirements," evaluated and substantiated the establishment of a minimum VT requirement, along with a related CASE Study on daylighting. The California CASE Studies concluded that setting a prescriptive minimum VT ensures maximum natural lighting and minimum artificial lighting for the energy baseline, and it is the simplest and most effective metric in the context of a prescriptive compliance approach.

The CASE Studies found that the more visible light that is provided through fenestration, the more likely internal electric lighting and resulting electric loads are reduced at peak times during the day, which provides a series of benefits beyond the obvious lighting electricity reductions, such as reduced cooling loads due to lower internal heat generated from lighting and, therefore, reduced cooling energy use to offset the lighting heat load and associated lower peak demand. The CASE study authors also found that "the VT requirement is predicted to give occupants a better connection to the outdoors, which has been shown to improve occupant comfort and productivity" (CASE Study, Nonresidential and High-Rise Residential Fenestration Requirements, page 10, note e). The California Energy Commission used the results of these CASE Studies and several months of stakeholder review and comments and staff workshops that followed to further develop, refine and adopt new Title 24 Building Energy Efficiency Standards with minimum prescriptive VT requirements. Starting January 2014, all new nonresidential and high-rise residential buildings and hotels/motels in California must meet or exceed the minimum VT requirements in this proposal.

The ideal type of glazing technology capable of meeting the VT requirements in this proposal is referred to by some in the industry as "triple-silver" low SHGC low-e glazing. Triple-silver coatings in a double-pane insulating glass unit provide excellent solar heat gain reduction without losing nearly as much visible light as other glazing types or shading approaches. A triple-silver coating is produced by multiple glazing manufacturers for both residential and nonresidential applications, and is widely available from commercial and residential fenestration manufacturers and contractors across the country. The benefit of a product like triple-silver low-e glazing is that it represents the best available combination of low SHGC, low U-factor and high VT at roughly the same cost to the user as glazing with a low SHGC and low VT. In other words, the visible light benefits can be obtained at little or no additional cost. The minimum VT requirements in this proposal will ensure that the *IECC* calls for the right glazing choice at the time the windows are installed. Even if controls and other techniques are not implemented at initial construction to maximize daylighting benefit, the minimum VT will still provide benefits. A minimum reasonable VT presents a greater opportunity for effective future retrofits of controls and other techniques, as well as increasing the likelihood of voluntary non-automatic lighting reduction by occupants.

The life-cycle costing analysis used by California in its CASE Studies substantiated that "double-pane triple-silver low-e coated glazing was the most cost-effective choice for a statewide fenestration standard" (CASE Study, Nonresidential and High-Rise Residential Fenestration Requirements, page 33).

The following graphic from the Efficient Window Collaborative's website compares and contrasts the solar heat gain reduction and visible light transmitting characteristics of various glazing types. As you can see from this graphic, double-pane, low solar gain (triple-silver) low-e glazing (the eighth option on the list) provides the best combination of low SHGC and high VT of standard glazing types. Note that the values in the graphic are for glass only without the frame – actual SHGCs and VTs for code compliance include the effects of frames, which will typically reduce both the SHGC and VT by at least 10%.



Benefits: Increased Light & View

Daylight and view are two of the fundamental attributes of a window. Unfortunately, windows can also be the source of significant solar heat gain during times when it is unwanted. Traditional solutions to reducing solar heat gain such as tinted glazing or shades mean that the amount of light is reduced as well. New glazings with low-solar-gain Low-E (spectrally selective) coatings can provide better solar heat gain reduction than tinted glass, with a minimal loss of visible light. This also means that views can be clearer and unobstructed.

Performance of Double-Glazed Low-Solar-Gain Low-E Glass (Spectrally Selective) and Argon Gas Fill

Note: All values are for glass only without frame. Source: Residential Windows by Carmody, Selkowitz, Arasteh and Heschong.

Verifying fenestration VT for code compliance will not add to cost or complexity. VT is simply another number to check that is already listed on the NFRC label, along with U-factor and SHGC. Also, *IECC* Table C303.1.3(3) already includes default VT values for products without NFRC ratings.

During California's most recent code adoption process, some commenters were concerned about glare being a problem associated with a minimum VT requirement. There was much evidence presented (by the California CASE Study authors and others) that refuted any suggestion that higher VTs lead to increased glare. Instead, it was shown that glare could be present regardless of a fenestration product's VT rating, and it is something best addressed through design, not VT.

Other options California considered for establishing minimum visible light criteria included effective aperture (EA) and light-to-solar gain ratio (referred to as LSG or VT/SHGC). California dismissed those as less effective alternatives, and we agree. Focusing first on EA, most daylighting experts agree that EA is overly complicated and unnecessary. The EA approach analyzed in California uncovered a technical loophole and energy penalty that made EA inferior to VT or VT/SHGC. The CASE Study noted "the reason that the EA approach is an energy penalty is that it results in low VTs at crucial WWRs" (CASE Study, Nonresidential and High-Rise Residential Fenestration Requirements, page 37). (Crucial WWRs, or window-to-wall ratios, are ones at or near 30%.) The CASE Study found that the EA penalty could be minimized by adding the complexity of more rules to the code, but such complexity would have been contrary to California's stated goal of simplification. An EA approach also would be contrary to the simplification improvements that the *IECC* has achieved over past cycles.

The second analyzed option of an LSG or VT/SHGC ratio would satisfy a simplification goal, because it relies on two readily available window performance metrics (VT and SHGC), but the same benefits with less complexity can be accomplished by simply setting a minimum VT. Those who supported the VT/SHGC approach in California seemed more interested in adopting the extremely weak 1.1 ratio that is presently required in limited applications in the *IECC* (Section C402.3.1.1(3)), as opposed to any particular reason why the LSG ratio approach would be better than simply setting a minimum VT. The problem with 1.1 VT/SHGC ratio is that it is not a particularly robust or effective target. If a VT/SHGC or LSG ratio approach were implemented in the *IECC*, the ratio would need to be much higher than 1.1 to achieve the same level of performance that California adopted. As an example, using a triple-silver low SHGC low-e glass that is available in today's market as a reference point, the VT/SHGC ratio would exceed 2.0.

To allow flexibility and a greater array of products to qualify, while preserving the core of the VT requirement and associated daylighting savings, several allowances are included in this proposal to match what was adopted in California. First and foremost, in California and in this proposal, the minimum VT is established as the prescriptive path energy baseline for the performance path. The prescriptive VT can be traded away in the performance path, so long as comparable energy savings are provided. Any glazing or combination of measures that deliver equivalent savings would be allowed, which provides the greatest flexibility. Also, as in California, this proposal allows the minimum VT requirements to be met on an area-weighted average basis, which permits some glass not to meet the minimum, so long as the glass meets the minimum on average. Lastly, this proposal includes as an exception, California's equation approach, as an alternative to the prescriptive VT values as a way to provide additional flexibility for buildings with higher glazing areas (Alternative Minimum VT = 0.11/FWR). California viewed this equation as a temporary option that likely will be removed in the next Title 24 rulemaking cycle.

It is also worth noting that the minimum prescriptive VT values that California's CASE Study initially substantiated and recommended were considerably more stringent than the values that were ultimately adopted and are being proposed here. The California Energy Commission Staff took into consideration several factors and comments throughout its rulemaking process, and the minimum prescriptive values and approaches ultimately settled upon in California were found to be sufficient for a reasonable group of products to qualify while still providing the daylighting benefits and savings that California set out to achieve.

While we too would have constructed a more stringent set of requirements if we were starting from scratch, we believe that adopting this fully-developed and soon-to-be-implemented approach from California, with its already built-in compromises, would be the best course to make real progress at this point on a national basis and hopefully garner additional support and avoid controversy. On balance, we think that additional refinements would best be considered in future code cycles.

In summary, adoption of the minimum VT requirements in this proposal will ensure that fenestration capable of meeting the *IECC's* insulating and solar gain performance requirements will not needlessly sacrifice visible light. The level of performance in this proposal can be met cost-effectively by existing readily available glazing technology. These proposed performance values will establish in the *IECC* the appropriate technology targets for high performance glazing that will generate significant cooling, heating and lighting energy savings.

Bibliography: Codes and Standards Enhancement Initiative (CASE), Nonresidential & High-Rise Residential Fenestration Requirements, 2013 California Building Energy Efficiency Standards, California Utilities Statewide Codes and Standards Team, September 2011.

http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/Envelope/2013_CASE_NR_Fenestration_Reqs_Sept_2011.pdf

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

C402.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee recognizes the complexity of addressing daylighting in the code and found this proposal to be too simplistic to address it. Orientation is not adequately addressed. There was concern that the numbers in the proposed table were not correct. There was concern that this approach wasn't appropriate for the prescriptive path of the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing Energy Efficiency Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of CE136, as submitted. We believe that this proposal is one of the biggest potential areas to save energy in the commercial code, specifically in the daylighting arena, which is still largely untapped for most commercial buildings under the IECC.

The VT requirements proposed in CE136 take an important step toward requiring adequate visible light transmittance for fenestration used in commercial construction. The original reason statement outlines the many reasons why this improvement is the logical next step for the IECC, so there is no need to repeat these arguments here. However, in response to issues raised by the commercial energy committee in its reason, a few clarifications are in order:

1. The values in CE136 come directly from the new California energy code, scheduled to take effect in 2014. These values are included in the prescriptive path and as the baseline for performance and other trade-offs in the California code. The California Energy Commission conducted extensive analysis of the values, cost effectiveness and approach across 16 California climate zones.
2. The committee was concerned that CE136 is "too simplistic" to address daylighting. While a set of requirements that included orientation may provide additional benefits, we think the proposed requirements capture the vast majority of the benefits from fenestration visible transmittance. If this approach works for the generally far more complex California

energy code, we think it will also work for the simpler IECC. Simplicity is a virtue, not a detriment, in the prescriptive path. More complex issues can be addressed through performance compliance.

3. Just as a moderate initial VT requirement was incorporated into the 2012 IECC, this proposal moves a great deal further toward reaping the full benefits of efficiency and visible transmittance in commercial buildings. While there may be additional improvements in the future, this is a sensible improvement for 2015.

CE136 helps ensure that the glazing used in commercial construction is not just energy efficient from a heating and cooling standpoint, but also provides the potential for energy savings from reducing lighting loads and all other benefits of fenestration with reasonable VTs.

CE136-13

Final Action: AS AM AMPC____ D

CE137-13

C202 (NEW), C402.3, C402.3.1.1, C402.3.1.2, C402.3.2.1, C402.3.3.3, C402.3.3.4, Table C406.3, C408.3.1

Proposed Change as Submitted

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.~~ *Daylight responsive controls* shall comply this section and Section C405.2.2.3.2.

C402.3.1.1 Increased vertical fenestration area with ~~daylighting controls~~ daylight responsive controls. In Climate Zones I through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. ~~Automatic daylighting controls~~ *Daylight responsive controls* are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

   Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with ~~daylighting controls~~ daylight responsive controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided ~~automatic daylighting controls~~ *daylight responsive controls* are installed in daylight zones under skylights.

C402.3.2.1 Lighting controls in daylight zones under skylights. ~~All lighting in the daylight zone shall be controlled by multilevel lighting controls that comply with Section C405.2.2.3.3.~~ *Daylight responsive controls* shall be provided to control the electric lights within *daylight zones* under skylights.

~~**Exception:** Skylights above daylight zones of enclosed spaces are not required in:~~

1. ~~Buildings in Climate Zones 6 through 8.~~
2. ~~Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).~~
3. ~~Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.~~
4. ~~Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.~~

C402.3.3.3 Increased skylight SHGC. In Climate Zones 1 through 6, skylights shall be permitted a maximum SHGC of 0.60 where located above daylight zones provided with ~~automated daylighting controls~~ *daylight responsive controls*.

C402.3.3.4 Increased skylight *U*-factor. Where skylights are installed above daylight zones provided with ~~automated daylighting controls~~ *daylight responsive controls*, a maximum *U*-factor of 0.9 shall be permitted in Climate Zones 1 through 3; and a maximum *U*-factor of 0.75 shall be permitted in Climate Zones 4 through 8.

TABLE C406.3
REDUCED INTERIOR LIGHTING POWER

(*Portions of Table not shown remain unchanged)*

a. In cases where both a general building area type and a more specific building area type are listed, the more specific building area type shall apply.
b. First LPD value applies if no less than 30 percent of conditioned floor area is in daylight zones. ~~Automatic daylighting controls~~ *Daylight responsive controls* shall be installed in daylight zones and shall meet the requirements of Section C405.2.2.3. In all other cases, second LPD value applies.
c. No less than 70 percent of the floor area shall be in the daylight zone. Automatic daylighting controls shall be installed in daylight zones and shall meet the requirements of Section 405.2.2.3.

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or ~~daylighting controls~~ *daylight responsive controls* are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments of ~~photosensor~~ *daylight responsive controls* reduce electric light based on the amount of usable daylight in the space as specified.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason: The terms "daylighting controls", "automatic daylighting controls", "automated daylighting controls" and "photosensor controls" are used interchangeably throughout the code but not defined. These terms are misleading because the controls they are describing do not control daylight, but rather they control electric lights in response to daylight. "Daylight responsive controls" is proposed to replace all of these terms.

The exceptions to C402.3.2.1 do not make any sense, as they are exceptions to the skylight requirement in the code, but Section C402.3.2.1 refers to daylighting controls, not skylights. The exact same list of exceptions appears under C402.3.2. We believe that including these exceptions under C402.3.2.1 was an unintentional oversight.

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

C402.3-EC-BAILEY

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The terminology in the proposal is not the same as used by NEMA.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~*Daylight responsive controls* shall comply with this section and Section C405.2.2.3.2.~~

C402.3.1.1 Increased vertical fenestration area with daylight responsive controls. In Climate Zones I through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

2. *Daylight responsive controls* <u>complying with the requirements of Section C405.2.2.3.1</u> are installed in daylight zones; and

C402.3.1.2 Increased skylight area with daylight responsive controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided *daylight responsive controls* <u>complying with the requirements of Section C405.2.2.3.1</u> are installed in daylight zones under skylights.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: Editorial. CE139 changes the way that the envelope section of the code refers to Section C405 and CE294 changes those portions of C405 which are being referred to. This public comment puts all of the pieces together. Section number C405.2.2.3.1 is the new section "Daylight responsive control function" in CE294.

CE137-13
Final Action: AS AM AMPC____ D

CE138-13
C402.3.1.1, C402.3.2

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone; and
2. Automatic daylighting controls are installed in daylight zones~~; and~~
3. ~~Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).~~

   ~~**Exception:** Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3~~.

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than 10,000 square feet (929 m^2), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent~~ with a skylight VT of at least 0.40~~; or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation C4-1.

Reason: The purpose of the proposed code change is to eliminate potentially unnecessary and inconsistent code provisions. The proposal is intended as a clean-up companion proposal to a separate proposal that would establish minimum VT performance requirements for fenestration under the *IECC* commercial energy efficiency chapter. If the companion proposal is adopted, this proposal would be useful to delete the VT references in these code sections because they would no longer be necessary and could be confusing. For example, the minimum VT for skylights in the companion minimum VT proposal is higher than the VT specified in section C402.3.2. Similarly, the VT/SHGC ratio referenced in section C402.3.1.1 will be unnecessary if the minimum VTs are adopted as proposed in the companion proposal, since the resulting VT/SHGC ratios from the VT minimums can be expected to be substantially higher.

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

C402.3.1.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

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Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Consistent with the action on CE136-13, the committee disapproved this proposal.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of CE138, as submitted. As explained in the original reason statement, CE138 eliminates language that would be unnecessary if CE136 is approved.

CE138-13
Final Action: AS AM AMPC____ D

CE142-13
Table C402.3, C402.3.3, C402.3.3.1, Table C402.3.3.1

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov); Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee and Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
Vertical fenestration																
***U*-factor**																
Fixed fenestration	0.50		0.50		0.46		0.38		0.38		0.36		0.29		0.29	
Operable fenestration	0.65		0.65		0.60		0.45		0.45		0.43		0.37		0.37	
Entrance doors	1.10		0.83		0.77		0.77		0.77		0.77		0.77		0.77	
SHGC																
Orientation[a]	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N
~~SHGC~~ PF < 0.2	0.25	0.33	0.25	0.33	0.25	0.33	0.40	0.53	0.40	0.53	0.40	0.53	0.45	NR	0.45	NR
0.2 ≤ PF < 0.5	0.30	0.37	0.30	0.37	0.30	0.37	0.48	0.58	0.48	0.58	0.48	0.58	NR	NR	NR	NR
PF ≥ 0.5	0.40	0.40	0.40	0.40	0.40	0.40	0.64	0.64	0.64	0.64	0.64	0.64	NR	NR	NR	NR
Skylights																
U-factor	0.75		0.65		0.55		0.50		0.50		0.50		0.50		0.50	
SHGC	0.35		0.35		0.35		0.40		0.40		0.40		NR		NR	

NR = No requirement.
a. "N" indicates vertical fenestration oriented within 45 degrees of true north. "SEW" indicates orientations other than "N." For buildings in the southern hemisphere, reverse south and north. Buildings located at less than 23.5 degrees latitude shall use SEW for all orientations.

C402.3.3 Maximum *U*-factor and SHGC. For vertical fenestration, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the window projection factor and orientation. For skylights, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3.

The window projection factor shall be determined in accordance with Equation 4-2.

$PF = A/B$ **(Equation 4-2)**

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

~~**C402.3.3.1 SHGC adjustment.** Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the required maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor.~~

~~TABLE C402.3.3.1~~
~~SHGC ADJUSTMENT MULTIPLIERS~~

~~PROJECTION FACTOR~~	~~ORIENTED WITHIN 45 DEGREES OF TRUE NORTH~~	~~ALL OTHER ORIENTATION~~
~~0.2 ≤ PF < 0.5~~	~~1.1~~	~~1.2~~
~~PF ≤ □0.5~~	~~1.2~~	~~1.6~~

Reason:
(Thompson): This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal moves and clarifies, but does not delete requirements that are currently contained in Section C402.3.3.1 and Table C402.3.3.1 of the 2012 IECC.

The purpose of this proposal is twofold: correct a technical error in the SHGC shading adjustment, and increase the enforceability and usability of the vertical fenestration requirements.

Technical Correction

During review of the 2012 IECC, a technical error was identified in the way the multipliers of the new Table C402.3.3.1 are applied to adjust the SHGC based on shading projections and orientation. When used, Table C402.3.3.1 illogically allows a higher SHGC on the west side of a building than on the north side. For example, with a 3 ft overhang above 6 ft tall glazing on a building in zone 3, this would require a max SHGC of 0.30 on the north where solar loads are low, yet would allow 0.40 SHGC on the west where solar impact on energy efficiency is more critical. The source of the problem is as follows. The multipliers are indirectly based on a similar SHGC adjustment in ASHRAE 90.1, which in turn was based on a technical paper using DOE2 simulations in 12 cities across various climate zones and latitudes (E.P. Kolderup and C.N. Eley Jr, “Evaluating the Impact of Overhangs and Sidefins”, ACEEE Summer Study on Energy Efficiency in Buildings, 1992). ASHRAE 90.1 determined that the multipliers could be grouped into two sets of multipliers: one for the south, east, and west (SEW) orientations, and one for the north (N) orientation. At the same time, this was meant to be used together with two sets of SHGC base criteria: one number for the overall building, and a separate number for the north side. This recognized the difference in the solar performance of the north side, and also avoided the technical problem now identified in the 2012 IECC with how the shading adjustments are used.

This was the case in ASHRAE 90.1-2004, but unfortunately, this technical rationale may have been forgotten and both ASHRAE 90.1 and IECC have deviated from this since then. The 2009 IECC avoided the multiplication problem by simply listing the required SHGC for different shading levels (projection factor PF), but did not address the difference between north and the other sides. On the other hand, ASHRAE 90.1-2007 and 2010 kept the different shading factors for SEW and N, but dropped the different baseline SHGC for the north in an effort to simplify – and as a result, they now contain the same technical error as 2012 IECC. This proposal aims to correct the error for the IECC, and the issue will also be raised at ASHRAE 90.1.

This proposal restores the basic format of the 2009 IECC where the required SHGC is directly listed for the appropriate climate zone and projection factor, but also reinstates the different SHGC criteria for the north side. While adding some rows, this table format improves usability and enforcement by allowing the required SHGC to be simply read from the main fenestration table instead of involving a separate table and calculation. There is no change in the 2012 baseline SHGC criteria, but the SEW multipliers are applied to directly show the adjusted SHGC for different shading levels (0.2 ≤ PF < 0.5 and PF ≥ 0.5) for the SEW orientations. Then, matching the adjusted SHGC requirement for N and SEW orientations for this high PF well shaded window, the SHGC requirements for the north side are then calculated at 0.2 ≤ PF < 0.5 and PF < 0.2 using the same multipliers. This ensures consistency, corrects the technical error of requiring higher SHGC on the west than on the north, and also accounts for the different solar performance of northern orientations.

Additionally, the footnote is added to clarify what to do if located in the southern hemisphere or near the equator. The northern multipliers do not apply well between the Tropics of Cancer and Capricorn (23.5 degrees latitude), and the SEW multipliers are more appropriate for all orientations. (Think of it this way: there is no difference between north and south in terms of the sun when standing at the equator.

Improved Usability and Enforcement

In addition to correcting the technical error, a very important aspect of this proposal is to improve usability and enforcement of the code. Concerns have been expressed about the increased complexity for enforcement with the format of the 2012 IECC, as compared to the 2009 and 2006 IECC. Rather than simply looking up the maximum SHGC for a given projection factor on the main prescriptive table, the 2012IECC forces extra unnecessary steps on the user, referring to a separate table and requiring additional calculations. This increases both the workload and potential for error in code compliance checks. This proposal simplifies the process by allowing the code official to simply look up the required SHGC on the main fenestration table, similar to the 2006 and 2009 IECC. This simplifies enforcement and compliance, makes it easy to determine the baseline value in performance path calculations, and improves overall usability of the code. Also, while SHGC requirements for the northern orientation have been added to make this section technically correct, this does not necessarily add complexity – users can still simply comply with one glass type and SHGC by meeting the main SHGC requirement for the SEW orientation (which is lower or equal to the N requirement in all cases).

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

(Culp): The purpose of this proposal is twofold: correct a technical error in the SHGC shading adjustment, and increase the enforceability and usability of the vertical fenestration requirements.

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Cost Impact: The code change proposal will not increase the cost of construction. This proposal is cost neutral as it is an optional trade-off only.

C402.3T-EC-THOMPSON-SEHPCAC-CULP

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason:. The proposal reorganizes the code requirements into a format which should be easier to use. It improves how the code addresses north facing fenestration.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of CE142. Given the large amount of fenestration area in typical commercial buildings and their substantial internal heat loads, controlling SHGC is very important. Unfortunately, CE142 weakens and complicates the IECC SHGC requirements, which results in unnecessary backsliding and a less efficient and more difficult to enforce IECC. If changes to the provisions governing the projection factor exception are necessary, EECC's CE156 is a much better solution. Our specific concerns with CE142 include:

- **CE142 substantially weakens the efficiency requirements (SHGC) of the IECC.** In CE142, the SHGC requirements for north-oriented windows with projection factors of 0 to 0.2 are <u>weaker in every climate zone than the current IECC</u>. The proponent does not justify why north-facing windows in all climate zones should be permitted to have <u>32% higher solar heat gain and SHGC requirements than currently</u>, or in the case of climate zones 7-8, why it is reasonable to eliminate the SHGC requirement entirely. This is not a "technical correction" as described by the proponents, but a substantial decrease in the efficiency of the IECC. While some may argue that northern SHGC is less important than other orientations, this is not a justification for reducing the current stringency of northern SHGC requirements, particularly without any showing of the need for or benefits of a reduction to requirements that have been in place many years. It should be kept in mind that "northern" orientations include northwest and northeast orientations and can get substantial sun, particularly during the summer and in the southern regions of the country. Moreover, there is a substantial potential for reflected light from other surfaces, including other buildings, making SHGC important for all commercial orientations.
- **CE142 unnecessarily complicates fenestration code compliance.** The current IECC fenestration table simply lists the SHGC requirement for each climate zone, providing clear requirements that will apply to the vast majority of buildings designed and constructed across the country. Where a design professional intends to take advantage of the exception to the SHGC requirements in Section C402.3.3.1, the section provides a simple multiplier that applies to two possible ranges of projection factor. In short, this approach significantly reduces work by the designer, builder and code official and limits the cases where projection factor must be calculated to those where the baseline SHGC is not met and there is a substantial projection.

CE142 complicates and confuses this simple requirement by including the projection factor ranges in the fenestration table, implying that a projection factor has to be calculated and that the exception applies to every fenestration product. This will cause significant confusion among design professionals and code officials in the majority of buildings where such calculations are unnecessary and the multipliers would not apply. If a design professional does not intend to use the projection factor exception to the SHGC requirement, there is no need to determine the orientation of each window (footnote a) or apply the multiple different SHGC requirements detailed in the fenestration table. It should be noted that measuring and calculating a projection factor for every window in every building and then checking such measurements and calculations to determine compliance will be daunting and time-consuming tasks, both for the code official and the builder, which will cause unnecessary enforcement headaches.

- **The approach to CE142 combines the basic SHGC requirements with the exception and reduces flexibility in the event SHGC requirements are modified in future codes.** In the current IECC, the tables are organized in a simple manner that will apply to the vast majority of buildings designed to the code. SHGC is no exception. Exceptions to the requirements (like the projection factor exception) and other trade-off methods are best detailed more fully in the sections that follow the prescriptive tables, in order to maintain clarity and usability of the code. Moreover, the current IECC projection factor multipliers will continue to work if baseline SHGC requirements are changed in the prescriptive table – under CE142 it is not clear what the new SHGC values would be if the baseline SHGC requirements change.

CE142 weakens the efficiency requirements of the 2012 IECC and adds significant unnecessary complexity to the simple fenestration table. It should be rejected.

CE142-13

Final Action: AS AM AMPC____ D

CE143-13
C202 (NEW), Table C402.3

Proposed Change as Submitted

Proponent: Shaunna Mozingo, City of Cherry Hills Village, Colorado Code Consulting, representing self. (smozingo@coloradocode.net)

Revise as follows:

TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

Climate Zone	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Vertical Fenestration								
***U*-factor**								
Nonmetal framing (all)	0.50	0.40	0.35	0.35	0.32	0.32	0.29	0.29
~~Fixed fenestration~~ Metal framing, fixed	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29
~~Operable fenestration~~ Metal framing, operable	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
Metal framing, entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
SHGC (all frame types)								

(Portions of Table not shown remain unchanged)

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

FENESTRATION, METAL FRAMING. Fenestration products using metal framing with or without thermal breaks.

FENESTRATION, NONMETAL FRAMING. Fenestration products using framing materials other than metal, with or without metal reinforcement or cladding.

FENESTRATION, FIXED. Vertical fenestration other than *operable fenestration* and *entrance doors* including, but not limited to, curtain wall, storefront, window walls, fixed windows, and picture windows.

FENESTRATION, OPERABLE. Vertical fenestration that opens, except *entrance doors.*

Reason: While I understand the reason the proponent of the table change submitted it for the 2012 IECC to go from windows classified by framing type to windows classified by whether they are fixed or operable, I definitely disagreed with it then and do so even more now that I have had to work with it as a code requirement. Code users are not looking for something as simple as fixed/operable as much as they are the types of framing because that is what we use everywhere else in this code. We have been taught that there is a real difference in metal framing verses all other types of window frames, and that we need to pay attention to the U-factors we are seeing. Now when we take away that framing issue and just say fixed/operable, it looks like framing type no longer matters, so we will go back to not verifying, going backwards in compliance as well as efficiency.

In reality, what is on paper and what happens in the field are two very different things. I am very much for energy efficiency. I have been saying for years that commercial windows are the least complied with requirement of the energy code because they don't usually have the handy labels on the windows and so few take the time to verify NFRC compliant certification. Very few will hold up a Certificate of Occupancy based on a U-Factor not being verified.   I know what is being enforced in a lot of jurisdictions, and I know that if we make it sound like all windows are created equal then the code officials will go back to their way of not worrying about it, and all of our hard work on educating them will have gone out the "metal framed window". A very large number of jurisdictions across the U.S. do absolutely nothing for verifying commercial windows other than seeing that something is listed on ComCheck, and then only half of those make sure that the U-Factor on ComCheck is within in the correct range for the type of framing. Many designers put the U-Factor in as the last item on a ComCheck and put whatever value will get it to pass, knowing full well that the jurisdiction will not verify it at plan review, and if they do, it won't get verified in the field. Ask NFRC how many certificates actually get requested.

The definition of U-Factor doesn't do enough to let the user know that we are not dealing with just center of glass here. It's the entire assembly that gets calculated together to create the U-Factor for this code. The code language in Chapter 3 states that U-Factor is calculated in accordance with NFRC 100. But there are hundreds of referenced standards and testing items in the codes, and I can absolutely tell you that the code official doesn't own them all or read them all, and many will not know or understand that NFRC 100 is for the whole assembly, glass and framing. They need something simple that lets them know that the framing materials matter when it comes to U-Factor, and by taking the table and converting it from framing materials to just fixed/operable, that one piece of information went away.

The default tables in Chapter 3 are based on framing materials and we are taught to figure out what the framing material is so that we can determine a conservative U-Factor and SHGC in the absence of a label or certification. We would need to change the default tables to match the table in Chapters C and R 4 if we are going to keep this new way of determining these values. But you can see by looking in these default tables that framing does matter, and not all windows should be treated as equal.

You can absolutely get a metal framed window to meet the same U-Factor of a window of different framing; it will just cost a lot more. There are structural reasons where metal framed windows are required and in these instances we will be forcing higher costs on the owner because these metal windows will cost a lot more in order to get these lower U-Factors out of them.

What has been proposed here is not exactly the same format as 2009 IECC but is consistent with the format of ASHRAE 90.1-2013. It makes the table a little cleaner than 2009 IECC, putting some of the language in the definitions. But it also uses metal fixed and metal operable, as opposed to metal curtain wall / storefront and metal all other. The main reason ASHRAE did this was because fixed punched opening windows (e.g. strip windows and picture windows) now fall under the more stringent fixed category, as opposed to the less stringent "all other" category, which was really intended to cover operable windows.

For nonmetal U-factors, I used the 2012 residential U-factors, except there is a question about zone 7-8. The residential chapter has 0.32, but the commercial chapter has 0.29 for metal framed fixed products. I chose not to take the nonmetal values from the residential values because it would have made the nonmetal values less stringent than the metal values, which currently requires triple glazing. So I adjusted them to 0.29 on the rationale of staying at least as stringent.

Cost Impact: These glazing values are already realized in the residential portion of the code but if just dealing with commercial buildings, there will be an increase in cost for the more efficient non-metal framed windows because the values were brought up to match those in the residential section.

C402.3T-EC-MOZINGO.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee was not convinced that the different framing types warranted differences in the U-factors.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing self; Dr. Thomas D. Culp, Birch Point Consulting, LLC, representing Aluminum Extruders Council, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

Climate Zone	**1**	**2**	**3**	**4 except Marine**	**5 and Marine 4**	**6**	**7**	**8**
Vertical Fenestration								
***U*-factor**								
Nonmetal framing (all)	0.50	0.40	0.35	0.35	0.32	0.32	~~0.29~~ 0.32	~~0.29~~ 0.32
Metal framing, fixed	0.50	0.50	0.46	0.38	0.38	0.36	~~0.29~~ 0.32	~~0.29~~ 0.32
Metal framing, operable	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
Metal framing, entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
SHGC (all frame types)								

(Portions of table not shown remain unchanged)

Commenter's Reason: We are asking that CE143 be approved as modified by this public comment to correct the fenestration categories in Table C402.3 and increase enforceability of the fenestration provisions. The original reason statement laid out clearly how this change is important to real-life training, enforcement, and verification of fenestration requirements in the field, helping to ensure that both code officials and designers/suppliers are using whole product performance and not making the same mistake of just using center-of-glass values, or worse, ignoring the fenestration energy requirements altogether. In addition, this proposal will make the format of the fenestration requirements consistent with the format of ASHRAE 90.1-2013, making use and enforcement of this section easier and more consistent.

Equally important, this proposal will (1) correct a *decrease* in energy efficiency that inadvertently occurred when the table format was changed in the last cycle, and (2) restore the distinction for different product types used in the diverse range of commercial buildings. First, when the table format was changed at the final action hearings last cycle, it was to establish much more stringent U-factors that could still be achieved by structural metal framed windows, albeit at higher cost, while simplifying the window types down to just fixed vs. operable windows. However, while this was focused on metal framed products that make up 91% of commercial fenestration because of structural and durability performance, this neglected to account for nonmetal residential-style windows that are used in multifamily and light commercial buildings that also fall under the commercial code. For those buildings that would have used these products anyway, the U-factor actually *increased* by 9 - 41% compared to the 2012 residential values (e.g. in zone 5, the U-factor was increased from 0.32 up to 0.38 for fixed windows and 0.45 for operable windows). This resulted in free trade-off credit for something that was going to be done anyway, increasing the overall energy use in these types of buildings.

Second, since first introduced by the New Buildings Institute in 2004, the commercial fenestration requirements have made a distinction between residential-style windows going into multifamily and light commercial buildings, and heavier commercial windows used for structural and durability purposes. This established a fair playing field in that the architect will select the window and framing type based on many building performance considerations, and then each category set an overall U-factor (whole assembly, with both glazing and framing) appropriate for that product type that ensures each product uses a comparable energy efficient glazing package. In other words, make each product type have to use similar energy efficiency measures (low-e, argon, better spacers, etc) to meet the requirement. However, as it stands without that distinction, the current table not only favors less structural products, but also, lighter residential-style windows can get away with a less efficient glazing package.

The 2006 and 2009 IECC used the simplest distinction – metal and nonmetal framed products. This was simple to understand and simple for code enforcement. This distinction between metal and nonmetal framing is also used in ASHRAE 90.1-2007, ASHRAE 90.1-2010, ASHRAE 90.1-2013, ASHRAE 189.1-2009, and ASHRAE 189.1-2011. This proposal will restore the distinction and level playing field for different products while also correcting the decrease in the stringency that occurred last cycle for residential-style products.

The proposed modification is to satisfy concerns raised during the preliminary hearings that the 0.29 U-factor in zones 7-8 would be inconsistent with the residential fenestration requirements. While we believe the original proposal is still valid, this comment would address those concerns and modify the U-factor to 0.32 in zones 7-8. Not only is this now consistent with the IECC residential requirements, it is also consistent with the ASHRAE 90.1-2013 requirements for nonmetal windows (and still 8-16% more stringent than the ASHRAE 90.1-2013 requirements for metal windows).

We ask that you vote "NO" to the initial motion for disapproval, and then vote "YES" to approve CE143 as modified by this comment.

CE143-13

Final Action: AS AM AMPC____ D

CE145-13
Table C402.3

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

CLIMATE ZONE	**1**	**2**	**3**	**4 EXCEPT MARINE**	**5 AND MARINE 4**	**6**	**7**	**8**
Vertical fenestration								
SHGC								
SHGC	0.25	0.25	0.25	~~0.40~~ <u>0.25</u>	~~0.40~~ <u>0.25</u>	~~0.40~~ <u>0.25</u>	0.45	0.45

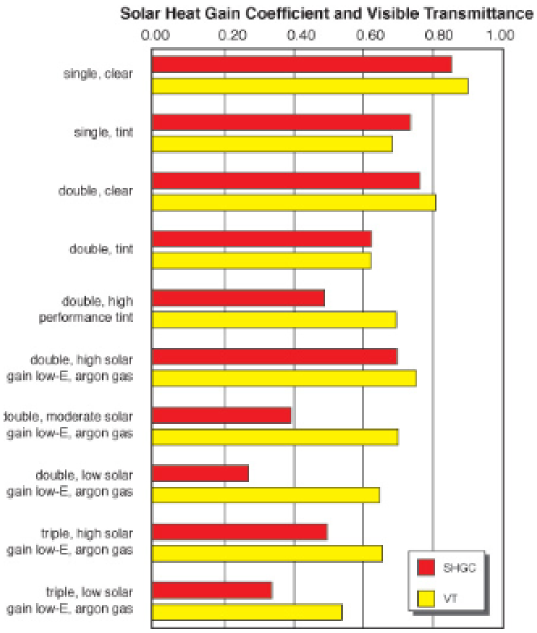
(Portions of Table not shown remain unchanged)

Reason: The purpose of the proposed code change is to strengthen the SHGC requirement for vertical fenestration in climate zones 4 - 6 from 0.40 to 0.25, thereby increasing the energy efficiency of vertical fenestration in these climates.

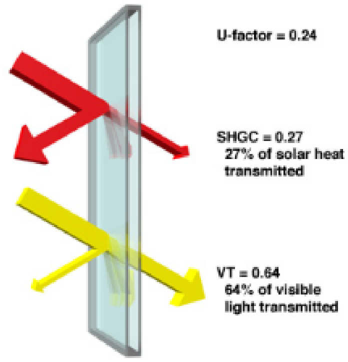
Low solar heat gain fenestration is even more critical for commercial buildings than residential buildings in all climate zones because commercial buildings tend to be internal heat load dominated, and require cooling during far more hours. Recognizing this fact, the code currently requires some degree of solar control in commercial buildings in all climate zones, by requiring an SHGC of 0.45 or less even in climate zones 7 - 8, 0.40 or less in climate zones 4 – 6; and 0.25 or less in climate zones 1 - 3. When the 0.40 maximum was established for climate zones 4 - 6, a consideration that may have justified the higher SHGC was the reduction in visible light that came with lower SHGC glazing at that time. However, this issue has since been addressed with the introduction of low SHGC glass with much higher visible light transmission resulting from optimizing control of solar gain outside of the visible light spectrum. As a result, lower SHGCs have already been established for homes in climate zones 1 -3 (dropping from 0.40 SHGC in the 2006 *IECC* to 0.25 in the 2012 *IECC*). A similar benefit can be captured for commercial buildings in climate zones 4 – 6 by setting the maximum SHGC at 0.25 for these climate zones. The level of solar heat gain, whether 0.40 or 0.25, is simply a choice of low-e coatings and does not involve significant increases in cost; there is no good reason not to capture the benefit of reducing the requirement to 0.25. The Efficient Windows Collaborative (“EWC”) shows how low solar gain, low U-factor and high visible light can now be achieved with improved glazings (see the graphic from their website below; note that these are glass-only values; since NFRC ratings also factor in frames, the reported SHGC and VT can be expected to be at least 10% lower):

Benefits: Increased Light & View

Daylight and view are two of the fundamental attributes of a window. Unfortunately, windows can also be the source of significant solar heat gain during times when it is unwanted. Traditional solutions to reducing solar heat gain such as tinted glazing or shades mean that the amount of light is reduced as well. New glazings with low-solar-gain Low-E (spectrally selective) coatings can provide better solar heat gain reduction than tinted glass, with a minimal loss of visible light. This also means that views can be clearer and unobstructed.



Note: All values are for glass only without frame. Source: Residential Windows by Carmody, Selkowitz, Arasteh and Heschong.

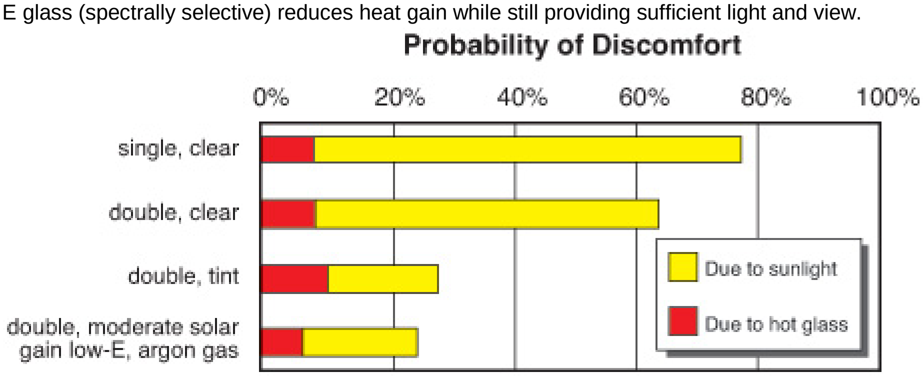


Performance of Double-Glazed Low-Solar-Gain Low-E Glass (Spectrally Selective) and Argon Gas Fill

It is well documented that buildings (which account for over 70% of the electricity used in the United States) have the greatest potential for reducing both energy use and particularly peak electricity use. Peak electricity use is driven by air conditioning load, which is, in large part, driven by summer solar gain. Lower SHGC windows will translate into substantial energy cost savings for building owners and a reduced need for utilities to build additional peak generating plants. For example, based on US DOE's EnergyPlus office reference buildings and an assumption of 30% fenestration area, we estimate a net energy savings (heating, cooling and hot water) for this proposed reduction in maximum SHGC to 0.25 ranging between 2% and 5% depending on the climate zone.

In addition, lower SHGCs will result in smaller cooling equipment for such buildings, easily offsetting any cost increase, thereby reducing first cost as well. Reducing SHGC will provide savings to all consumers, and not just the owners or operators of buildings. Lower SHGCs also produce increased summer comfort, as also illustrated by the EWC on its website. According to EWC:

> In summer, strong direct sunlight strikes people and interior surfaces, creating overheating and discomfort. Windows with low solar heat gain coefficients will reduce the solar radiation coming through the glass and associated discomfort. Low solar heat gain low-E glass (spectrally selective) reduces heat gain while still providing sufficient light and view.



Source: Lawrence Berkeley National Laboratory (Lyons and Arasteh).

For all of these reasons, reducing the SHGC prescriptive requirement to 0.25 in climate zones 4 – 6 is justified in order to reduce energy use and electrical peak demand in commercial buildings.

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

C402.3T #1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: : The proposal represents a huge change in stringency, The SHGC values are even lower than ASHRAE 90.1. While 0.25 may be cost effective for some buildings, the committee questioned the application to smaller commercial buildings and to residential buildings covered by this part of the code. The committee found the proposal unacceptable.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

CLIMATE ZONE	**1**	**2**	**3**	**4 EXCEPT MARINE**	**5 AND MARINE 4**	**6**	**7**	**8**
Vertical fenestration								
SHGC								
SHGC	0.25	0.25	0.25	0.25	~~0.25~~ 0.30	~~0.25~~ 0.30	0.45	0.45

Commenter's Reason: We recommend approval of CE145 as modified. Better controlling SHGC in commercial buildings in climate zones 4 – 6 will result in substantial energy, peak demand and cost savings, as well as other potential societal benefits.

The committee recognized potential energy savings, but stated, "While 0.25 may be cost effective for some buildings, the committee questioned the application to smaller commercial buildings and to residential buildings covered by this part of the code." In response to this concern, ICF International has conducted additional analyses of smaller commercial buildings and also residential buildings covered under this code. The ICF analysis does include both small commercial buildings and residential building types questioned by the committee and shows energy savings in all climate zones.

First, it should be noted that cost effectiveness is not a significant issue related to SHGC choice – any cost difference for glass with SHGC values between 0.40 and 0.25 would be very small – the only difference necessary between a 0.40, 0.35, 0.30 and 0.25 SHGC rating in commercial fenestration is the specific type of low-e coating selected. It should also be noted that glass designed to produce SHGCs as low as 0.25 today can also provide substantial light transmission as the glass has been carefully designed to prevent transmission of non-visible solar gain while maintaining reasonable visible light. Moreover, since reductions to SHGC substantially reduce cooling load, which results in smaller capacity and lower cost cooling equipment, we would expect that lower SHGC glazing is cost-beneficial based on reduced equipment cost alone.

Second, as to energy savings, we have found that when including all of the major commercial building types in the analysis, there are substantial energy savings by reducing the SHGC in all of these climate zones. The savings do drop somewhat as we move northward reflecting the balance between heating and cooling energy. In addition, in climate zones Marine 4, 5 and 6, the energy savings level off around 0.30 SHGC. As a result, we have developed the proposed modification, making the maximum SHGC 0.30 in climate zones Marine 4, 5 and 6 and 0.25 in climate zone 4. We estimate that this modified proposal will save roughly 2% energy across these climate zones based on our updated analysis. While we continue to support adopting the proposal as submitted, given the other potential benefits from a lower SHGC, we also believe that the proposed modification is a reasonable alternative.

SHGC reductions produce more than simply energy savings. Solar heat gain is a major driver of cooling load in buildings. Cooling load drives larger building cooling systems and electric utility peak demands, as most utilities even in northern US climates, are summer-peaking. By producing lower peak demands, lower SHGC fenestration creates other societal energy-related benefits such as reduced impact on the electric grid, reduced need to build more power plants and expanded transmission grids, and reduced on-peak electric prices.

CE145-13

Final Action: AS AM AMPC____ D

CE149-13
C402.3.2

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2 Minimum skylight ~~fenestration~~ area. In an enclosed space greater than 10,000 square feet (929 m^2) in floor area directly under a roof with ~~a~~ not less than 75 percent of ceiling area with heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, non-refrigerated warehouse, retail store, distribution/sorting area, transportation depot, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide ~~a minimum skylight area to daylight zone under skylights of~~ either

1. A minimum skylight area to daylight zone under skylights of not less than 3 percent ~~with a skylight~~ where all skylights have a VT of at least 0.40 when tested in accordance with NFRC 202, or
2. A ~~provide~~ minimum skylight effective aperture of at least 1 percent as determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperature} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}} \qquad \textbf{(Equation 4-1)}$$

where:

Skylight area = Total fenestration area of skylights.

Skylight VT = Area weighted average visible transmittance of skylights.

WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.

Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

Reason: This proposal clarifies the language pertaining to requiring skylights in roofs covering areas greater than 10,000 ft^2. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

By definition skylights are fenestration such that the use of the term fenestration with skylights is redundant. The intent is to address ceilings with variable heights and the proposed revision does that by indicating the requirement applies when more than 75% of ceiling area is above 15 feet. Some of the subject spaces referenced are not technically spaces or areas so the language has been enhanced to convey the intent. Simplification is achieved by making items 1 and 2 parallel construction with reference to the charging section. While VT is defined, there is no referenced test method. NFRC 202 provides a uniform test method by which VT can be objectively determined and should be referenced to enhance uniformity of application and implementation of and compliance verification with the code.

Cost Impact: The code change proposal will not increase the cost of construction. There is no cost impact associated with this proposed change because the current code requires daylighting control.

C402.3.2 #2-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent was not sure that NFRC 202 was the appropriate standard to be referenced. The testimony indicated that this standard referenced did not address domed skylights that are commonly used in commercial applications.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.2 Minimum skylight area. In an enclosed space greater than 10,000 square feet (929 m^2) in floor area directly under a roof with ~~a~~ not less than 75 percent of the ceiling area with a ceiling height ~~heights~~ greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, non-refrigerated warehouse, retail store, distribution/sorting area, transportation depot, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide either

1. A minimum skylight area to daylight zone under skylights of not less than 3 percent where all skylights have a VT of at least 0.40 ~~when tested in accordance with NFRC 202~~ as determined in accordance with Section C303.1.3,, or

2. A minimum skylight effective aperture of at least 1 percent as determined in accordance with Equation 4-1.

Commenter's Reason: At the code development hearing, only one issue was raised in opposition to the code change proposal. Specifically the reference to NFRC 202 that is appropriate for flat panel skylights only. This could result in confusion as to what to do for plastic domed skylights when determining the VT of such products, since there is no reference standard for those skylights. There was no intent to omit any skylight type, and it is recognized that all skylights need to have a means for determining VT.

A further review of that comment and the code suggests that the issue of testing standards for fenestration products such as skylights is covered in Section C 303.1.3 (fenestration product rating). So, the basis for measuring and expressing VT is already covered in the code and need not be addressed in this section of the code. The code change proposal is further modified in this public comment by simply referring to Section C303.1.3 where the basis for VT is covered either through testing or use of a default table. There was no opposition to the other portions of the change, all of which were focused on clarification and simplification of the code provisions and are not proposed for further modification in this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE149-13

Final Action: AS AM AMPC____ D

CE152-13
C402.3.3 (NEW)

Proposed Change as Submitted

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Add new text as follows:

C402.3.3 Daylight zones. In *buildings* not greater than two stories above grade plane, not less than 10 percent of the net floor area shall be located within a *daylight zone*. In *buildings* three or more stories above grade plane, not less than 5 percent of the net floor area shall be located within a *daylight zone.*

Exception: Daylighting in accordance with this section is not required in the following spaces:

1. Auditoriums, places of religious worship, theaters, museums, mercantile occupancies with less than 10,000 square feet of net floor area, and refrigerated warehouses.
2. Existing buildings undergoing *alteration*, *repair*, relocation, or a change of occupancy.
3. *Buildings* where the total daylight potential (TDP) calculated in accordance with Section 808.3 of the *International Green Construction Code* is less than 0.5.

Reason: This proposal would require a minimum daylight area similar in concept to the 2012 International Green Construction Code, but at much less aggressive level (only 1/5 of the IgCC) and with a simplified approach. For comparison, the IgCC requires 50% of the net floor area to be in daylight zones for 1-2 story buildings, and 25% for 3+ story buildings. On the other hand, this proposal is meant to only be a simple base level requirement to ensure that building designers address daylighting and glazing layout, while being easy enough to provide flexibility for different space and building types, and not require any gross changes in building geometry. Exceptions are included for spaces where daylighting would interfere with the function of the space, provide little benefit, or not be feasible.

Cost Impact: This proposal will not increase the cost of construction for most buildings and will help improve layout and use of glazing that would have been installed anyway, but this will increase the cost of construction in some buildings where there would have been insufficient fenestration and daylighting.

C402.3.3 (NEW)-EC-CULP.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the exceptions were not adequate and that there were unintended consequences from this proposal. For example one would not want to daylight a movie studio. Requiring daylighting in residential buildings would be problematic.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dr. Thomas C. Culp, Birch Point Consulting LLC, representing Glazing Industry Code Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. In buildings not greater than two stories above grade, not ~~No~~ less than 50 percent of the ~~conditioned~~ net floor area is within a *daylight zone*; In buildings three or more stories above grade, not less than 25 percent of the net floor area is within a *daylight zone*;
2. Automatic daylighting controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

   Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

~~**C402.3.3 Daylight zones.** In *buildings* not greater than two stories above grade plane, not less than 10 percent of the net floor area shall be located within a *daylight zone*. In *buildings* three or more stories above grade plane, not less than 5 percent of the net floor area shall be located within a *daylight zone.*~~

~~**Exception:** Daylighting in accordance with this section is not required in the following spaces:~~

~~1. Auditoriums, places of religious worship, theaters, museums, mercantile occupancies with less than 10,000 square feet of net floor area, and refrigerated warehouses.~~
~~2. Existing buildings undergoing *alteration*, *repair*, relocation, or a change of occupancy.~~
~~3. *Buildings* where the total daylight potential (TDP) calculated in accordance with Section 808.3 of the *International Green Construction Code* is less than 0.5.~~

Section C202
Definitions:

FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

Commenter's Reason: The original purpose of CE152 was to require a minimum amount of daylight zones similar to the *2012 International Green Construction Code*, but at a much lower level (only 1/5th of the IgCC requirement) in recognition of the IECC being a base energy code. Nonetheless, while many expressed support for the concept, the committee felt that *requiring* a minimum amount of daylight zones was too aggressive for the IECC at this time, and even with the exceptions, it would be difficult to apply to every building type covered by the code.

Therefore, this public comment modifies the proposal based on the committee feedback to increase the incentive for daylight zones without making it a requirement, while at the same time correcting section C402.3.1.1 to be more consistent with the IgCC. It moves the requirement that a minimum percentage of the floor area be within a daylight zone to the optional path of section C402.3.1.1, which provides an incentive allowing increased window area as long as the minimum daylight zones are provided, along with automatic daylighting controls and certain glazing properties.

When first written as a requirement, the original proposal set the minimum daylight zones at 1/5 of that required by the IgCC. Since this is now written as an optional incentive, it is appropriate to set the level higher, and we have chosen to use the same levels required by the IgCC: 50% of the net floor area for 1-2 story buildings, and 25% of the net floor area in higher buildings. Note that this also corrects the current language of section C402.3.1.1 to be consistent with the IgCC, including adding the definition of net floor area consistent with the IgCC and IBC. In the time after approval of the 2012 IECC and during development of the 2012 IgCC, it was noted that it is much more difficult to achieve the 50% daylit area in the more constrained floor plates of taller buildings, so 25% was used for buildings 3 stories and up. It doesn't make sense for this part of the IECC to be more restrictive than the IgCC, so this proposed modification serves both purposes of turning the original proposal from a requirement into an incentive for designers to increase daylight zones, while also making this subsection more consistent with the IgCC.

We ask that you vote "NO" on the initial motion for disapproval, and then vote "YES" to approve CE152 as modified by this comment.

CE152-13

Final Action: AS AM AMPC____ D

CE153-13
C402.3.2.2

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive, service, manufacturing, non-refrigerated warehouse, retail store and distribution/sorting area spaces shall have a glazing materials or diffuser with a ~~measured~~ haze factor greater than 90 percent when tested in accordance with Procedure A of ASTM D 1003.

> **Exception:** Skylights ~~designed~~ installed to exclude direct sunlight entering the occupied space by use of fixed or automated baffles, or the geometry of skylight and light well ~~need not comply with Section C402.3.2.2~~.

Reason: This proposal clarifies the testing requirements for fenestration haze factor to reference Procedure A of ASTM D 1003 or other ASTM standards as applicable.

The requirement for testing in the code eliminates the need to use the term "measured," and could provide additional confusion should a user of the code interpret that as allowing post-installation measurement of haze factor in accordance with the standard. ASTM D 1003 has multiple procedures. Procedure A (hazemeter) test values are normally slightly higher and less variable than Procedure B (spectrophotometer) test values. Where the code indicates a singular criterion (90%) a singular test procedure should be specifically referenced. If there are two test procedures that yield different results for the same metric then the code should provide a separate criterion for each procedure (e.g. 90% when tested per procedure A and a TBD equivalent percentage when tested per procedure B). Also replacing "designed" with "installed " provides clarification as a skylight can be "designed" in the factory where the installation conditions in the exception may not be known. Those conditions are related to the installation of the skylight within the building and are more appropriately referenced in the code.

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

C402.3.2.2-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that the proposal limited the testing to one procedure. Testimony had identified the potential applicability of more than one procedure.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, non-refrigerated warehouse, retail store and distribution/sorting area spaces shall have ~~a~~ glazing materials or diffuser with a haze factor greater than 90 percent when tested in accordance with ~~Procedure A of~~ ASTM D 1003.

Exception: Skylights designed and installed in such a manner as to exclude direct sunlight entering the occupied space by use of fixed or automated baffles, or the geometry of the skylight and light well.

Commenter's Reason: At the code development hearing, there were two issues raised in opposition to the code change proposal. One proposed a floor modification to retain the word 'designed' in the exception, and that floor modification was approved for consideration. The other concern raised was with limiting the determination of haze factor to only Procedure A of ASTM D1003. Testimony mentioned the difference between Procedure A and Procedure B, and that those skylights that had been tested to Procedure B would have to be re-tested.

Procedure A and B differ with respect to how the light is transmitted through the sample. Procedure A directly transmits the light beam through the sample into a reflecting integrating sphere and measures light transmission. Procedure B is reversed, where the light is reflected into an integrating sphere and then transmitted through the sample. Procedure A provides results that are less variable than those obtained through Procedure B. The difference between procedure A and B is also due to the different equipment and manufacturers of the equipment used with each.

In the original proposal, DOE expressed the view that if there is a singular criterion that must be satisfied (in this case haze factor), the allowance for two separate procedures to determine haze factor that would not yield the exact same results. DOE felt that this created two paths to compliance, with an increased likelihood that the path of least resistance would be taken. However, DOE understands the challenges associated with re-testing of products. This public comment addresses that issue by not calling out either procedure in ASTM D 1003, but retains the remainder of the code change proposal as editorially enhanced, and includes the floor amendment that was accepted at the code development hearing.

Note that CE154-13 was recommended for approval as submitted and the modifications contained in this public comment do not conflict with CE154-13 and would be readily additive with that change.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE153-13

Final Action: AS AM AMPC____ D

CE156-13
C402.3.3, C402.3.3.1

Proposed Change as Submitted

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3.3 Maximum U-factor and SHGC. For vertical fenestration, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the <u>climate zone, type of vertical fenestration and, for SHGC, adjusted where necessary for</u> window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3 <u>by climate zone</u>.

~~The window projection factor shall be determined in accordance with Equation C4-2.~~

~~PF = A/B~~ ~~**(Equation C4-2)**~~

~~where:~~

~~PF = Projection factor (decimal).~~

~~A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.~~

~~B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.~~

~~Where different windows or glass doors have different PF values, they shall each be evaluated separately.~~

C402.3.3.1 SHGC adjustment. Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the ~~required~~ maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the <u>adjustment</u> multiplier specified in Table C402.3.3.1 corresponding with the ~~orientation of the fenestration product and the~~ projection factor <u>for each fenestration product</u>.

TABLE C402.3.3.1
SHGC ADJUSTMENT <u>FOR</u> <u>PROJECTION FACTOR</u> ~~MULTIPLIERS~~

PROJECTION FACTOR	~~**ORIENTED WITHIN 45 DEGREES OF TRUE NORTH**~~ <u>**SHGC ADJUSTMENT MULTIPLIER**</u>	~~**ALL OTHER ORIENTATION**~~
0.2 ≤ PF < 0.5	~~1.1~~ <u>1.2</u>	~~1.2~~
PF ≥ 0.5	~~1.2~~ <u>1.6</u>	~~1.6~~

<u>The projection factor for each vertical fenestration product shall be determined in accordance with Equation C4-2.</u>

<u>PF = A/B</u> <u>**(Equation C4-2)**</u>

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different PF values, they shall each be evaluated separately.

Reason: The purpose of this proposal is to simplify and improve the code in how it addresses the prescriptive U-factor and SHGC requirements for fenestration and the effects of projection factor by:

- cleaning up, clarifying and making the language more specific;
- moving the projection factor methodology and equation to a more appropriate place in the IECC (in the section that establishes an adjustment for projection factor);
- eliminating the need to calculate the projection factor for each window for buildings with little (<0.20) or no projection factor and which do not qualify for an SHGC adjustment; and
- applying a uniform projection factor multiplier to SHGC requirements, regardless of the orientation of the fenestration.

The current IECC applies a different SHGC multiplier to fenestration oriented within 45 degrees of true north as opposed to all other fenestration. While the multipliers yield mathematically correct results based on the current approach in *ASHRAE 90.1*, some code users have expressed concern that windows facing north should not be required to meet a lower SHGC number than windows facing other directions. This proposal eliminates this concern, while simplifying the code, by moving to a single multiplier for all orientations. At the same time, by retaining the multiplier approach, this proposal allows for an automatic adjustment in the event the underlying SHGC values are modified in the future.

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

C402.3.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Consistent with previous actions on proposals related to fenestration U-factors and SHGC adjustment factors.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of CE156, as submitted. This proposal should be approved for the reasons outlined in the original reason statement. While the current language in the code is adequate and much better than CE142, which also addresses projection factor, CE156 is an improvement over both. CE156 is a simpler and less confusing solution to calculating projection factor adjustments, and unlike CE142, CE156 does not weaken the baseline efficiency of the 2012 IECC.

CE156-13

Final Action: AS AM AMPC____ D

CE161-13, Part I
C402.3.3.5, R402.3.2 (IRC N1102.3.2)

Proposed Change as Submitted

Proponent: Dr. Helen Sanders, SAGE Electrochromics Inc. (helen.sanders@sageglass.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.3.3.5 Dynamic glazing. ~~For compliance with Section C402.3.3, the SHGC for *dynamic glazing* shall be determined using the manufacturer's lowest-rated SHGC, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC.~~ <u>*Dynamic glazing* shall be permitted to satisfy the SHGC and VT requirements of Table C402.3 and Section C402.3.1.1 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 3, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps.</u> *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not *dynamic glazing* shall not be permitted.

Reason: (Part I) Last cycle, the commercial IECC clarified how to deal with code compliance for dynamic glazing, and dynamic glazing is also now addressed in the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. This was important in that dynamic glazing offers the unique ability to reversibly change properties such as SHGC and VT to optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory.

However, to provide additional assurances that the dynamic glazing delivers the maximum energy savings, this proposal strengthens the requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. The minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. Also, with a minimum SHGC dynamic ratio of 3, the current language about using the lowest rated SHGC for compliance is no longer needed … the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. Furthermore, although the dynamic range is specified as a SHGC ratio, this also ensures a good dynamic range for VT, which will be higher than the SHGC ratio. (Typical products commonly have SHGC range from <0.10 to >0.40, and VT range from <0.04 to >0.50.)

Finally, the dynamic glazing must be properly controlled in order to optimize energy performance. Dynamic glazing is almost always already sold as a system integrated with automatic controls, but this proposal clarifies that the dynamic glazing must be automatically controlled in multiple steps, and not rely on manual adjustment by occupants.

(Part II) Dynamic glazing is currently defined and addressed in the commercial IECC, as well as the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. However, the residential IECC does not currently address how to deal with compliance of dynamic glazing. Dynamic glazing is unique in that it has the ability to reversibly change properties such as SHGC and VT. This allows the glazing to be controlled optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. For example, unlike traditional glazing with fixed properties, dynamic glazing can be operated in a lower SHGC state during summer to reduce cooling loads, and a higher SHGC state during winter to reduce heating loads.

As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory. Dynamic glazing has been available on the market for 10 years now, and manufacturing expansions have come on line in 2012 to provide larger pane sizes at higher volumes and lower prices to allow broader application. Not only should its use be encouraged, but barriers to its use must be removed. Specifically, the NFRC label for dynamic glazing which has been in place for a number of years, lists two values for SHGC, representing the range over which the SHGC varies. It is not clear how this label should be used to determine compliance with maximum or minimum SHGC requirements, and direction must be given to aid enforcement by the building code official.

Because of the ability of dynamic glazing to optimize solar gain and energy efficiency, the commercial IECC already allows compliance with SHGC requirements by simply saying to use the lower labeled SHGC value, and to treat dynamic glazing separately from other fenestration in the building (no mixing in area-weighted averages). To provide additional assurances of proper performance, this proposal provides a stronger requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. First, the minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. The minimum SHGC dynamic ratio of 3 will also more than ensure compliance with the lowest rated SHGC … the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. (In practice, typical products commonly have SHGC range from <0.10 to 0.40.) Second, the dynamic glazing must be properly controlled in order to optimize energy performance. Automatic controls are especially important in a residential home or apartment, where the occupant may not be home to manually adjust the glazing. A separate proposal is also being submitted to the commercial IECC to strengthen those requirements in a similar manner.

References:

1. "Window Systems for High-Performance Buildings" by Carmody, Selkowitz, Lee, Arasteh, Willmert, 2004, pages 94-100.
2. Lawrence Berkeley National Laboratory – Paper 50502
   "High Performance Commercial Building Facades" by Lee, Selkowitz, Bazjanac, Inkarojrit, and Kohler, 2002. See especially p. 28. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-50502.pdf
3. Lawrence Berkeley National Laboratory – Paper 54924
   "Daylighting control performance of a thin-film ceramic electrochromic window: field study results" by Lee, DiBartolomeo, Selkowitz, 2005. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-54924.pdf

Cost Impact: The code change proposal will not increase the cost of construction. The large majority of dynamic glazing is already sold with automatic control systems.

CE161-C402.3.3.5-EC-SANDERS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the intent of dynamic glazing. Approval is consistent with action by Residential Energy Code Development Committee to approve Part II of this item.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dr. Helen Sanders, SAGE ELectrochromics Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.3.5 Dynamic glazing. *Dynamic glazing* shall be permitted to satisfy the SHGC and VT requirements of Section ~~Table~~ C402.3 ~~and Section C402.3.1.1~~ provided the ratio of the higher to lower labeled SHGC is greater than or equal to ~~3~~ 2.4, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not *dynamic glazing* shall not be permitted.

> **Exception:** *Dynamic glazing* is not required to comply with this section when both the lower and higher labeled SHGC already comply with the requirements of Table C402.3.

Commenter's Reason: CE161 parts 1 and 2 were both unanimously recommended for approval by the commercial and residential energy code committees, respectively. This public comment simply builds upon that by making a few corrections / clarifications that were noticed during the public comment period:

1. Section numbers were corrected. In part 1, it is more correct to reference Section C402.3 instead of just Table C402.3, so that it also covers when VT is needed in subsections C402.3.1.1 and C402.3.2. In part 2, this is simply an editorial correction to the correct table number.

2. The ratio of higher to lower labeled SHGC was adjusted to 2.4 to account for the full range of window product categories and frame-to-glass ratios at NFRC standard sizes, and to ensure other dynamic glazing products are not inadvertently excluded.
3. The exception was added to clarify that a product whose full range already complies with Table R402.1.1 does not need to comply with the extra requirements of this section such as automatic control, since it is already in compliance just like a normal window.

Dynamic glazing is an important energy savings technology that has been available for 10 years and will be in even wider use during the time period when this code is adopted and enforced, so it is important to address it properly in the energy code. We ask you to please vote to approve CE161 parts 1 and 2 as modified by this comment.

CE161-13, Part I

Final Action: AS AM AMPC____ D

CE161-13, Part II
C402.3.3.5, R402.3.2 (IRC N1102.3.2)

Proposed Change as Submitted

Proponent: Dr. Helen Sanders, SAGE Electrochromics Inc. (helen.sanders@sageglass.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R402.3.2 (N1102.3.2) Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table R402.3.3 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 3, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

Reason: (Part I) Last cycle, the commercial IECC clarified how to deal with code compliance for dynamic glazing, and dynamic glazing is also now addressed in the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. This was important in that dynamic glazing offers the unique ability to reversibly change properties such as SHGC and VT to optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory.

However, to provide additional assurances that the dynamic glazing delivers the maximum energy savings, this proposal strengthens the requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. The minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. Also, with a minimum SHGC dynamic ratio of 3, the current language about using the lowest rated SHGC for compliance is no longer needed … the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. Furthermore, although the dynamic range is specified as a SHGC ratio, this also ensures a good dynamic range for VT, which will be higher than the SHGC ratio. (Typical products commonly have SHGC range from <0.10 to >0.40, and VT range from <0.04 to >0.50.)

Finally, the dynamic glazing must be properly controlled in order to optimize energy performance. Dynamic glazing is almost always already sold as a system integrated with automatic controls, but this proposal clarifies that the dynamic glazing must be automatically controlled in multiple steps, and not rely on manual adjustment by occupants.

(Part II) Dynamic glazing is currently defined and addressed in the commercial IECC, as well as the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. However, the residential IECC does not currently address how to deal with compliance of dynamic glazing. Dynamic glazing is unique in that it has the ability to reversibly change properties such as SHGC and VT. This allows the glazing to be controlled optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. For example, unlike traditional glazing with fixed properties, dynamic glazing can be operated in a lower SHGC state during summer to reduce cooling loads, and a higher SHGC state during winter to reduce heating loads.

As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory. Dynamic glazing has been available on the market for 10 years now, and manufacturing expansions have come on line in 2012 to provide larger pane sizes at higher volumes and lower prices to allow broader application. Not only should its use be encouraged, but barriers to its use must be removed. Specifically, the NFRC label for dynamic glazing which has been in place for a number of years, lists two values for SHGC, representing the range over which the SHGC varies. It is not clear how this label should be used to determine compliance with maximum or minimum SHGC requirements, and direction must be given to aid enforcement by the building code official.

Because of the ability of dynamic glazing to optimize solar gain and energy efficiency, the commercial IECC already allows compliance with SHGC requirements by simply saying to use the lower labeled SHGC value, and to treat dynamic glazing separately from other fenestration in the building (no mixing in area-weighted averages). To provide additional assurances of proper performance, this proposal provides a stronger requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. First, the minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. The minimum SHGC dynamic ratio of 3 will also more than ensure compliance with the lowest rated SHGC … the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. (In practice, typical products commonly have SHGC range from <0.10 to 0.40.) Second, the dynamic glazing must be properly controlled in order to optimize energy performance. Automatic controls are especially important in a residential home or apartment, where the occupant may not be home to manually adjust the glazing. A separate proposal is also being submitted to the commercial IECC to strengthen those requirements in a similar manner.

References:

1. "Window Systems for High-Performance Buildings" by Carmody, Selkowitz, Lee, Arasteh, Willmert, 2004, pages 94-100.
2. Lawrence Berkeley National Laboratory – Paper 50502
   "High Performance Commercial Building Facades" by Lee, Selkowitz, Bazjanac, Inkarojrit, and Kohler, 2002. See especially p. 28. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-50502.pdf
3. Lawrence Berkeley National Laboratory – Paper 54924
   "Daylighting control performance of a thin-film ceramic electrochromic window: field study results" by Lee, DiBartolomeo, Selkowitz, 2005. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-54924.pdf

Cost Impact: The code change proposal will not increase the cost of construction. The large majority of dynamic glazing is already sold with automatic control systems.

CE161-C402.3.3.5-EC-SANDERS.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Approved as Submitted

Committee Reason: This is a proven technology that provides flexibility for achieving energy savings in the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dr. Helen Sanders, SAGE Electrochromics, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.3.2 (N1102.3.2) Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table ~~R402.3.3~~ <u>R402.1.1</u> provided the ratio of the higher to lower labeled SHGC is greater than or equal to ~~3~~ <u>2.4</u>, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

> <u>**Exception:** *Dynamic glazing* is not required to comply with this section when both the lower and higher labeled SHGC already comply with the requirements of Table R402.1.1.</u>

Commenter's Reason: CE161 parts 1 and 2 were both unanimously recommended for approval by the commercial and residential energy code committees, respectively. This public comment simply builds upon that by making a few corrections / clarifications that were noticed during the public comment period:

1. Section numbers were corrected. In part 1, it is more correct to reference Section C402.3 instead of just Table C402.3, so that it also covers when VT is needed in subsections C402.3.1.1 and C402.3.2. In part 2, this is simply an editorial correction to the correct table number.

2. The ratio of higher to lower labeled SHGC was adjusted to 2.4 to account for the full range of window product categories and frame-to-glass ratios at NFRC standard sizes, and to ensure other dynamic glazing products are not inadvertently excluded.
3. The exception was added to clarify that a product whose full range already complies with Table R402.1.1 does not need to comply with the extra requirements of this section such as automatic control, since it is already in compliance just like a normal window.

Dynamic glazing is an important energy savings technology that has been available for 10 years and will be in even wider use during the time period when this code is adopted and enforced, so it is important to address it properly in the energy code. We ask you to please vote to approve CE161 parts 1 and 2 as modified by this comment.

CE161-13, Part II

Final Action: AS AM AMPC____ D

CE164-13
C402.4, C402.4.1.2, C402.4.1.2.3

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8. Alternatively the building thermal envelope shall be permitted to be tested in accordance with ASTM E779 at a pressure differential of 0.3 inches water gauge, or an equivalent method approved by the code official, and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope does not exceed 0.40 cfm/ft^2. Where compliance is based on such testing the building shall also comply with Sections C402.4.5, 402.4.6 and 402.4.7.

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque portions of the building thermal envelope shall comply with Section C402.4.1.2.1, or C402.4.1.2.2. ~~or C402.4.1.2.3~~.

~~**C402.4.1.2.3 Building test.** The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft^2 at a pressure differential of 0.3 inches water gauge (2.0 L/s · m^2 at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official.~~

Reason: This proposal clarifies the language pertaining to the sealing of penetrations in the building thermal envelope associated with continuous air barriers so that all three compliance options associated with air barriers are equivalent.
The current code lists three options for meeting the provisions of the opaque building envelope. The first two that deal with the opaque components are valid and allow compliance based on either the materials used or the assemblies of the envelope. The test is also a valid way of addressing air leakage on a performance basis. Unfortunately, a whole building test includes fenestration such that the test cannot address only opaque sections of the envelope as is the case with the other two options. All three options should be comparable and have the same scope. For this reason the text has been more appropriately rearranged. One approach prescriptively addresses the particular components of the building thermal envelope and their construction and installation as well as individual air leakage properties. The other provides a performance oriented approach that is based on the testing currently allowed, since all possible means of air leakage through the envelope are measured

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

C402.4-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal relocates the alternative compliance option in the code so that it occurs before the prescriptive standards which would have to be used if the alternative isn't chosen.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8. Alternatively the building thermal envelope shall be permitted to be tested in accordance with ASTM E779 at a pressure differential of 0.3 inches water gauge, or an equivalent method approved by the code official, and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope does not exceed 0.40 cfm/ft^2. Where compliance is based on such testing the building shall also comply with Sections C402.4.5, 402.4.6 and 402.4.7.

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

    ~~**Exception:** Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.~~

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This change is needed to address some housekeeping items associated with this change and CE167-13, which was also recommended for approval. Note that there was no opposing testimony, adverse comment or committee concern raised about either CE164-13 or CE167-13 at the first public hearing. With the approval of CE164-13 Section C402.4.1.2.3 is moved to Section C402.4. This places the compliance path that is based on building testing up front so that those choosing this option are not required to specifically address criteria no longer relevant (e.g., if you are testing the building then it is not necessary to specifically follow criteria covering air barrier penetrations and then inspect them.) With this change, you either meet the performance test criterion or not, and if not, then the building must sealed better. This approach is very similar to what is currently done for testing duct systems for leakage. The exception to Section C402.4.1.1 refers to Section C402.4.1.2.3, which per CE164-13 does not exist. This is a simple housekeeping change to remove the exception, because there is no more Section C402.4.1.2.3 and as noted above is covered in Section C402.4 as stated above because any building so tested does not need to specifically comply with Section C402.4.1.1.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Public Comment 2:

Jim Edelson, New Buildings Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8. Alternatively the building thermal envelope shall be permitted to be tested in accordance with ASTM E779 at a pressure differential of 0.3 inches water gauge, or an equivalent method approved by the code official, and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope does not exceed 0.40 cfm/ft^2. Where compliance is based on such testing the building shall also comply with Item 2 of Section C402.4.1.1, and Sections C402.4.5, 402.4.6 and 402.4.7.

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque portions of the building thermal envelope shall comply with Sections C402.4.1.2.1~~,~~ and C402.4.1.2.4, or Sections C402.4.1.2.2. ~~or~~ and C402.4.1.2.4.

C402.4.1.2.4 Continuous air barrier commissioning. Prior to the final inspection, the *registered design professional* shall provide evidence of *commissioning* of the *continuous air barrier* by an *approved agency.* A final commissioning report shall be delivered to the building owner, and shall include at a minimum:

1. A field inspection checklist showing the requirements necessary for proper installation of the *continuous air barrier*.
2. Results of any *building air leakage* testing.
3. Reports from field inspections during project construction showing compliance with *continuous air barrier* requirements including but not limited to proper material handling and storage, use of approved materials and approved substitutes, proper material and surface preparation, air barrier continuity at *building thermal envelope* penetrations

Commenter's Reason: The committee approved CE 164 but disapproved a similar proposal in CE 169. In Disapproving CE 169, the Committee stated that the idea was good, but that the language needed to be clear that "Commissioning should not be limited to Registered Design Professionals" and that "testing is not the only way to determine compliance".

This public comment accomplishes what the committee stated by providing compliance options, and by making important simplifications and clarifications to the air barrier commissioning language.

In order to clarify the issue regarding Registered Design Professionals, this Comment applies the definitions of "registered design professionals", "commissioning', and 'approved agency' already used in the IECC and the IgCC. The Comment then uses these terms in a duplicate of the existing charging language in Section C408.2 of the IECC that clearly specifies that the registered design professional only has to provide the documentation that Commissioning has been completed. The Commissioning itself may be done by any Approved Agency.

CE164-13

Final Action: AS AM AMPC____ D

CE165-13
C402.4

Proposed Change as Submitted

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8.

> **Exception:** The provisions of this section shall not be required for roof repairs, roof recovering and roof replacement where the alterations, renovations or repairs to the building do not also include alterations, renovations or repairs to the remainder of the building envelope.

Reason: This code change proposal is intended to clarify the Code's intent regarding when air barriers are and are not required as components of buildings' thermal envelopes.

In existing buildings that do not currently include an air barrier in the building's thermal envelope, it can be interpreted the addition of an air retarder is required in roof repair, roof recover or roof replacement projects where the project's scope does not otherwise require alterations, renovations or repairs to the remainder of the building's thermal envelope. In these situations, the addition of an air retarder to the roof assembly only will do little to and be ineffective in improving the building envelope's overall air leakage performance.

This Exception provides clarity by specifically indicating an air retarder is not required for roof repairs, roof recovering or roof replacement where the scope of the project does not also include alterations, renovations or repairs to the remainder of the building envelope.

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

C402.4-EC-GRAHAM.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee found the exception too broad. It would waive any opportunity to improve the efficiency of the roof assembly where only the roof assembly was being upgraded. Finally, the proposal is located in the wrong portion of the code. It should be located with other existing building provisions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jason Wilen, AIA, CDT, RRO, National Roofing Contractors Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

> **Exception:** The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.
9. Air barriers shall not be required for roof repair, roof recover, and roof replacement where the alterations, renovations or repairs to the building do not also include alterations, renovations or repairs to the remainder of the building envelope.

Commenter's Reason: Following the committee's recommendations, this proposal is being modified by relocating the new text from section C402.4 as originally proposed to section C101.4.3. The text is changed slightly from the original proposal to match the format of section C101.4.3.

Also, because proposal CE56-13 was approved as modified by the committee, the terms "Roof Recover", "Roof Repair" and "Roof Replacement" are now defined in the IECC.

CE165-13

Final Action: AS AM AMPC____ D

CE166-13
C402.4.1

Proposed Change as Submitted

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

> ~~**Exception:** Air barriers are not required in buildings located in Climate Zones 1, 2 and 3.~~

Reason: This proposal deletes the exception for air barriers in Climates Zones 1, 2 and 3. Air barrier use is important to the energy efficiency, moisture performance and comfort in all climate zones and therefore should be included for all climate zones. This change would also make the provisions within the IECC more consistent with both ASHRAE 90.1 and the IgCC.

Cost Impact: The code change proposal will increase the cost of construction in zones 1, 2 and 3.

C402.4.1-EC-WESTON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal is too broad. The committee felt that air barriers should be waived in the dry climate zones of 2B and 3B.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted and because public comments were received.

Public Comment 1:

Theresa W. Weston, DuPont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

> <u>**Exception**: Air barriers are not required in buildings located in Climate Zone 2B</u>

Commenter's Reason: The original proposal removed the exception for air barriers in Climate Zones 1, 2 and 3, thus requiring air barriers in all climate zones. Air barrier use is important to the energy efficiency, moisture performance and comfort in all climate zones. A NIST Report investigated direct energy savings from reduced air leakage, and found energy savings from infiltration in all climate zones, including cooling dominated climates.

Simulated Location	Climate Zone	Building Type	Annual Energy Savings
Phoenix, AZ	2B	Office Building	$745
Phoenix, AZ	2B	Retail Building	$1169
Phoenix, AZ	2B	Multi-unit Residential Building	$133
Miami, FL	1A	Office Building	$769
Miami, FL	1A	Retail Building	$1231
Miami, FL	1A	Multi-unit Residential Building	$411

This report found air barriers to be cost effective with the exception of office building with masonry backup in climate zones 1 and 2.

In addition to the direct energy efficiency benefits of air barriers, there are indirect energy efficiency benefits from preventing moisture "piggy-backing" on air intruding and accumulating within building assemblies. When insulation gets wet its R-value can be reduced 60 to 70%. This is a critical in hot humid climates.

Analyzing the data in light of the committee's opinion that the proposal was too broad, this modification leaves the exception in place for zone 2B. The modified proposal would increase consistency with both ASHRAE 90.1 (which has an exception for masonry construction in Climate Zone 2B) and the IgCC (which has no exceptions).

NISTIR 7238, "Investigation of the impact of Commercial Building Envelope Airtightness on HVAC Energy Use", *S. J. Emmerich, Tim McDowell, W. Anis*

Controlling the Transfer of Heat, Air & Moisture through the Building Envelope M.C. Swinton, W.C. Brown, G.A. Chown

Public Comment 2:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Submitted.

Commenter's Reason: Air barriers provide the most cost-effective source of energy conservation of any provision in this code. The committee report states "The proposal is too broad. The committee felt that air barriers should be waived in the dry climate zones of 2B and 3B." Climate Zones 2B and 3B, comprised of Southern California, Arizona, New Mexico and West Texas, experiences hot summers and cold winters, Phoenix alone has a temperature range of 16 to 122 degrees, and Abilene varies between a low of minus-9 and a high of plus-110 degrees. A 2005 NIST report (NISTIR 7238) shows 77% gas savings and 9% electrical savings resulting from air barrier installation in a Phoenix office building, while in a Phoenix retail building the savings were 64% for gas and 14% for electricity. Air barriers represent sensible and economical energy-saving technology across all US climate zones.

CE166-13

Final Action: AS AM AMPC____ D

CE167-13
C402.4.1.1, C402.4.2

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seats associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

~~3.~~ 4. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Exception: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 4~~3~~.

~~**C402.4.2 Air barrier penetrations.** Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.~~

Reason: This proposal clarifies the language pertaining to the sealing of penetrations in the building envelope. The objective of the proposal is to increase the simplicity of the code.

The provisions of C402.4.2 are currently out of place. They have the same standing in the order of the code as C402.4.1 yet are actually a component of the air barrier provisions. They are more appropriately located as a part of the code text addressing air barrier construction. In addition, the present item 2 is duplicated by C402.4.2 to a large degree so the text has been revised to focus on penetrations.

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

C402.4.2-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal relocates one of the criteria for air barrier construction from a separate section to be listed with the other criteria. There is no change to the technical requirements.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. ~~Air barrier penetrations shall be sealed in accordance with Section C402.4.2.~~ The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seats associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
4. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

   Exception: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.

Commenter's Reason: This change is needed to address a single housekeeping item. The deletion of the reference to Section C402.4.2 of the code regarding the sealing of air barrier penetrations is needed, because pursuant to this change the provisions that were in C402.4.2 are now located in the new numbered item 3 to Section C402.4.1.1 above, and are therefore not available at C402.4.2 for reference. Note that there was no opposing testimony, adverse comment or committee concern raised about CE167-13 at the first public hearing.

CE167-13

Final Action: AS AM AMPC____ D

CE168-13
C402.4.1.2, C402.4.1.2.1, C402.4.1.2.2, C402.4.1.2.3

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.4.1.2 Air barrier testing ~~compliance options~~. A continuous air barrier for the building envelope shall ~~comply with Section C402.4.1.2.1, C402.4.1.2.2, or C402.4.1.2.1~~.

~~**C402.4.1.2.1 Materials.** Materials with an air permeability no greater than 0.004 cfm/ft^2 (0.02 L/s · m^2) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.~~

1. ~~Plywood with a thickness of not less than 3/8 inch (10 mm).~~
2. ~~Oriented strand board having a thickness of not less than 3/8 inch (10 mm).~~
3. ~~Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).~~
4. ~~Foil-back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).~~
5. ~~Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m3) having a thickness of not less than 11/2 inches (36 mm).~~
6. ~~Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m^3) and having a thickness of not less than 4.5inches (113 mm).~~
7. ~~Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).~~
8. ~~Cement board having a thickness of not less than 1/2 inch (12 mm).~~
9. ~~Built up roofing membrane.~~
10. ~~Modified bituminous roof membrane.~~
11. ~~Fully adhered single-ply roof membrane.~~
12. ~~A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).~~
13. ~~Cast-in-place and precast concrete.~~
14. ~~Fully grouted concrete block masonry.~~
15. ~~Sheet steel or aluminum.~~

~~**C402.4.1.2.2 Assemblies.** Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft^2 (0.2 L/s · m^2) under a pressure differential of 0.3 inches of water gauge (w.g.)(75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.~~

1. ~~Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;~~
2. ~~A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.~~

~~**C402.4.1.2.3 Building test.** The completed building shall~~ be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft^2 at a pressure differential of 0.3 inches water gauge (2.0 L/s · m^2 at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. <u>A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to code official and the building owner. Where the tested rate exceeds 0.40 cfm/ft^2, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be</u>

submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

Reason: This proposed amendment requires air barrier testing for building envelopes.

Air leakage through building envelopes wastes significant HVAC energy, and provides a pathway for moisture intrusion into building envelope assemblies. Losses of 30% of conditioned air through uncontrolled air leakage are frequently reported, and mechanical systems must be oversized to accommodate this risk. Air barrier testing greatly reduces loss of conditioned air, providing the best energy savings returns per dollar invested of any technology.

The lists of air barrier materials and assemblies in the 2009 code include common materials such as gypsum board and plywood that in practice qualify almost any contemporary building to meet the code requirements. However, the materials and assemblies themselves are not the main source of air barrier leakage problems – instead, most leakage occurs in the transitions between various materials. Field testing is the only method, short of continuous third-party inspection, that a continuous air barrier can be ensured. Seattle's experience, after mandating that air barriers be tested during this current code cycle (but not requiring that air barriers must meet the test standard) is that all buildings have passed the test.

The proposal eliminates most of the text between C402.4.1.2 and C402.4.1.2.3.1. However with the legislative format it is a little confusing. The net result of this proposal is Section D402.4.1.2 would read as follows:

> **C402.4.1.2 Air barrier testing.** A continuous air barrier for the building envelope shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft^2 at a pressure differential of 0.3 inches water gauge (2.0 L/s · m^2 at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to code official and the building owner. Where the tested rate exceeds 0.40 cfm/ft^2, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

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

C402.4.1.2-EC-KRANZ.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee preferred to maintain the three avenues for determining compliance in air barrier construction. A test only requirement is not practicable for all buildings. The proposal was unclear regarding whether third parties could be used to conduct and evaluate the testing.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.4.1.2 Air barrier compliance ~~options~~. A continuous air barrier for the ~~opaque~~ building envelope shall comply with Sections C402.4.1.2.1 through C402.4.1.2.4 ~~, C402.4.1.2.2, or C402.4.1.2.3~~.

C402.4.1.2.1 Air barrier materials. ~~Materials with~~ Air barriers shall have an air permeability no greater than 0.004 cfm/ft2 (0.02 L/s · m2) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178, or shall be one of the following: ~~shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.~~

1. Plywood with a thickness of not less than 3/8 inch (10 mm).
2. Oriented strand board having a thickness of not less than 3/8 inch (10 mm).
3. Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).
4. Foil-back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).
5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m3) having a thickness of not less than 1-1/2 inches (36 mm).

6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m3) and having a thickness of not less than 4.5 inches (113 mm).
7. Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).
8. Cement board having a thickness of not less than 1/2 inch (12 mm).
9. Built up roofing membrane.
10. Modified bituminous roof membrane.
11. Fully adhered single-ply roof membrane.
12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).
13. Cast-in-place and precast concrete.
14. Fully grouted concrete block masonry.
15. Sheet steel or aluminum.

C402.4.1.2.2 **~~C402.4.1.1~~** **Air barrier construction.** The continuous air barrier shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation
4. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

~~**Exception:** Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.~~

C402.4.1.2.3 **~~C402.4.1.2.2~~** **Assemblies.** Assemblies forming part of an air barrier shall have an air permeability ~~of materials and components with an average air leakage~~ not to exceed 0.04 cfm/ft2 (0.2 L/s · m2) under a pressure differential of 0.3 inches of water gauge (w.g.)(75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 ~~shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.~~ or shall be one of the following:

1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;
2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.

C402.4.1.2.4~~3~~ Building test. The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft^2 at a pressure differential of 0.3 inches water gauge (2.0 L/s · m^2 at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to code official and the building owner. Where the tested rate exceeds 0.40 cfm/ft^2, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

~~**C402.4.2 Air barrier penetrations.** Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.~~

Commenter's Reason: If approved, this public comment will require pressure testing of commercial buildings to confirm that the building envelope complies with the air leakage limits in the code. Effective air barriers provide the best energy savings per construction dollar invested so insuring their effectiveness is very important. Air barrier testing creates an incentive for builders to take greater care during the design and construction process to select appropriate materials, seal cracks, joints and annular space around penetrations to effectively reduce the loss of conditioned air. Air leakage through building envelopes wastes significant HVAC energy, and provides a pathway for moisture intrusion into building envelope assemblies. Losses of 30% of conditioned air through uncontrolled air leakage are frequently reported, and mechanical systems must be oversized to accommodate this risk.

This public comment reorganizes some of the text in Section C402.4 related to "Air leakage" to be more user-friendly and makes all four subsections mandatory. These include: 1) Air barrier materials, 2) Air barrier construction, 3) Assemblies, and 4) Building testing. Item #3 in Section C402.4.1.2.2, related to penetrations of barriers, is currently found in Section C402.4.2. It is moved to Section C402.4.1.2.2 because it more closely relates to air barrier construction. Section 402.4.2 is proposed to be deleted.

This public comment also responds to industry concerns that the existing list of materials and assemblies deemed to form air barriers, and which was originally proposed to be deleted, should remain in the code so that code officials can determine whether the plans submitted for permit meet the minimum specified standard

CE168-13

Final Action: AS AM AMPC____ D

CE177-13, Part I
C402.4.1.2 (New), R402.1.2 (New), (IRC N1102.4.1.2 (New))

Proposed Change as Submitted

Proponent: Brent Ursenbach, Salt Lake County representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C 402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion space conditioning fuel burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table C402.1.2 or C402.2, where the walls shall meet a minimum of the below-grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section C403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Sections 901, 902, 903, 904, and 905 of the *International Mechanical Code*, and Section 2111.13 of the *International Building Code.*

Reason: (Part I) The entire section C402.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. The building testing option for leakage in C402.4.1.2.3 cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the building; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.
(Part II) The entire section N1102.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. Blower door testing as now required by the code cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the home; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Cost Impact: The code change proposal will increase the cost of construction, while it will reduce the energy consumption and cost throughout the life of the home.

C402.4.1.2 (NEW)-EC-URSENBACH.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The text proposal is unclear. Application is not clear. Would it inadvertently control other equipment such as gas dryers. The proposal seems to be describing a 'thermal isolation' without using the defined term.

Assembly Action: Approved as Modified

Modify the proposal as follows:

C402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion space conditioning fuel burning appliances, the appliances and combustion air openings shall be located outside of the building thermal envelope or enclosed in a room isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table C402.1.2 or Table C402.2, where the walls, floors and ceilings shall meet the minimum of the below-grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section C403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

(Portions of proposal not shown remain unchanged)

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified and because a public comment was received.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Disapproval.

Commenter's Reason: The proposal would require an unrealistic design solution to this issue. Creating little 'out of thermal envelope' closets for each apartment in a building is an incredibly expensive solution. The proposal dictates a single design solution; and one that is too restrictive. It doesn't allow for testing and balancing of systems which can achieve compliance with the code. There are other design options for providing outside air to individual furnace installations.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE177-13, Part I
Final Action: AS AM AMPC____ D

CE177-13, Part II
C402.4.1.2 (NEW), R402.1.2 (NEW), (IRC N1102.4.1.2 (NEW))

Proposed Change as Submitted

Proponent: Brent Ursenbach, Salt Lake County representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R402.4.1.2 (N1102.4.1.2) Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.1, where the walls shall meet a minimum of the basement wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section 402.4.2 and Section R1006 of the *International Residential Code*.

Reason: (Part I) The entire section C402.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. The building testing option for leakage in C402.4.1.2.3 cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the building; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.
(Part II) The entire section N1102.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. Blower door testing as now required by the code cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the home; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Cost Impact: The code change proposal will increase the cost of construction, while it will reduce the energy consumption and cost throughout the life of the home.

C402.4.1.2 (NEW)-EC-URSENBACH.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: The committee disapproved this consistent with action taken on RE62-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brent Ursenbach, Salt Lake County Representing Utah Chapter ICC; Hope Medina, Cherry Hills Village, representing Colorado Chapter ICC, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion, space conditioning fuel burning appliances, the appliances and combustion air openings shall be located outside of the building thermal envelope, or enclosed in a room isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.1, where the walls, floors and ceilings shall meet the minimum of the below- grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section 402.4.2 and Section R1006 of the *International Residential Code*.

Commenter's Reason: This proposal, after failing on the residential side was modified as shown above, resulting in approval by assembly action on the commercial side.

The entire section R402.4 Air leakage- is of little value when a combustion air duct is installed, open to a conditioned space, virtually placing a large hole through the thermal envelope. The building testing requirement for leakage in R402.4. 1.2 is extremely difficult to accomplish, with a combustion air opening inside the thermal envelope. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, which require outside combustion, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Addressing opponents concerns:

Opposition was expressed to the original proposal as the higher R-values for floors and ceilings were correctly considered excessive, hence this modification where the R-values for all surfaces separating the equipment room from conditioned space met the R-value of U-Factor for basement walls from Tables R402.1.1. With this modification, this was approved on the commercial side through assembly action. The temperature inside these rooms will not reach the outside extremes; therefore the insulation R-value has been decreased.

The committee listed to reason for disapproval as being consistent with RE62. RE62 addressed insulation only to the full level of the thermal envelope and did not address sealing, which is a mandatory requirement in the IECC.

An opponent expressed opposition based on a 12 year old AGA study which discourages insulating these equipment rooms, based on the large quantities of heat leaking and radiating off appliances is beneficial to the conditioned space. That was the case prior to the much tighter duct sealing, increased duct insulation requirements, and increased IECC enforcement. This study is out dated.

A committee member expressed reservations that somehow this proposal would require combustion air for gas dryers. Please note the proposal states in the first sentence- '**where** open combustion air ducts'- this proposal only applies where combustion air ducts are required. There is not an outside combustion requirement for gas dryers in the IFGC.

Several expressed opposition, seeking the addition of definitions and testing procedures of the Combustion Appliance Zone (CAZ). This proposal is not in opposition of CAZ, as CAZ addresses situations, typically in existing buildings, where combustion air is drawn from within the conditioned space, not through an open duct to outside. CAZ methods undoubtedly should be applied to those situations.

CE177-13, Part II

Final Action: AS AM AMPC____ D

CE179-13, Part I
C402.4.2, Table R402.4.1.1 (IRC Table N1102.4.1.1)

<u>Proposed Change as Submitted</u>

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

<u>Exception:</u>

1. <u>Penetrations of the air barrier for a*utomatic* sprinkler systems installed according to the *International Building Code* or the *International Fire Code*,</u>

Reason: (Part I) This proposal seeks to exempt fire sprinkler systems, specifically pendent sprinklers (and other similar sprinklers), that penetrate the typical building envelope at the ceilings by adding an exception.

Section C402.4.2 of the 2012 IECC states that the penetrations in the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Caulking the sprinkler, escutcheon, or cover plate could delay, cease or interrupt the flow of the fire sprinkler. In cases when a concealed pendent fire sprinkler is used, the caulk may adhere to the cover plate to the ceiling material and severely delay the fast response of the sprinkler.

Caulked Concealed

The same IECC section above, also states that the "sealing materials shall be appropriate to the construction materials being sealed". Caulk and other sealants are never compatible with the sprinklers, escutcheons and cover plates. In fact, some caulks and sealants are chemically incompatible with certain piping and the pipe manufacturers shall be consulted prior to applying any material.

The fire sprinkler, escutcheon and cover plate are designed to fit together without any adhesive. Escutcheons and cover plates can have gaps or spaces that are required to meet certain specification tolerances for activation of the sprinkler, but in most cases the escutcheons and cover plates should fit tightly to the wall or ceiling.

Furthermore, the intent of the IECC (Section C101.3) is not "intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances." When fire sprinklers are installed or required by other codes such as the IBC, they are installed according to those referenced standards. Fire sprinklers are installed by NFPA 13 (Standard for the Installation of Sprinkler Systems), NFPA 13R (Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height) and NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) along with IRC Section P2904.

These codes and standards require that all fire sprinklers, escutcheons and cover plates be listed and installed according to that listing. The testing and listing process (of fire sprinklers, escutcheons, and cover plates) does not take into account any additional field applied materials on the sprinkler, escutcheon and cover plate, such as: paint, caulk, drywall compound, and other construction materials. This prohibition is not only reiterated, but is enforced by NFPA 13 and NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) as both of these standards require full replacement of the affected components when found. When a fire sprinkler is properly installed, the escutcheon and/or cover plate should adequately seal the penetration.

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

C402.4.2-EC-HUGO. doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal implies there is no method by which sprinkler systems can be installed and at the same time maintaining adequate air barrier sealing. Appropriate sealants are available.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. <u>Sealing of concealed fire sprinklers, when required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.</u>

~~**Exception:**~~

~~1. Penetrations of the air barrier for a*utomatic* sprinkler systems installed according to the *International Building Code* or the *International Fire Code*,~~

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This public comment is no longer asking for a blanket exception for all components of an automatic sprinkler system that penetrate an air barrier. It is putting the previous criteria into the body of the charging paragraph and is narrowed down to the concealed sprinkler. There are two types of concealed sprinkler; pendent and sidewall. The most common air barrier penetration is the pendent concealed sprinkler, however, there may be times when a sidewall concealed sprinkler is used. This public comment seeks to address both, since it is critical to life safety and property protection that when a concealed sprinkler is sealed that it be sealed accordingly and maintain its listings and approvals.

The primary purpose of this change stays the same, which is to prohibit field caulking or sealing of concealed sprinklers. Concealed sprinklers are popular for designers and architects as they are virtually hidden on the surface and cover plates can be colored to match decor. They are the most preferred sprinkler in many occupancies. Because of their makeup and function, when they are caulked or sealed in the field by using sealants, caulk or other methods, it impairs the operation of the sprinkler. Concealed sprinklers with foreign materials attached such as caulk, paint, sealants, foam, tape, etc are no longer considered compliant with their listing and approvals.

Sprinkler manufacturers do have products available to appropriately seal these sprinklers to meet the commercial energy code.

This public comment is to insert language to assist the code official and user of the energy code. Installing sprinklers contrary to their listing is prohibited by the IECC, IFC, IBC, NFPA 13 and NFPA 25 already.

CE179-13, Part I

Final Action: AS AM AMPC____ D

CE179-13, Part II
C402.4.2, Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proposed Change as Submitted

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA[a]
Automatic sprinkler systems	Penetrations of the building envelope for *automatic* sprinkler systems installed according to the *International Residential Code*, *International Building Code* and *International Fire Code* are exempt from being sealed.
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.

COMPONENT	CRITERIA[a]
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: (Part II) This proposal seeks to exempt fire sprinkler systems, specifically pendent sprinklers (and other similar sprinklers), which penetrate the typical building envelope at the ceilings by adding a new automatic sprinkler systems row in the component and criteria columns of Table R402.4.1.1.

NFSA fire sprinkler contractors are reporting that local authorities and building owners are caulking fire sprinklers in order to pass the air leakage testing. Caulking the sprinkler, escutcheon, or cover plate could delay, cease or interrupt the flow of the fire sprinkler. In cases when a concealed pendent fire sprinkler is used, the caulk may adhere to the cover plate to the ceiling material and severely delay the fast response of the sprinkler.

Caulk and other sealants are never compatible with the sprinklers, escutcheons and cover plates. In fact, some caulks and sealants are chemically incompatible with certain piping and the pipe manufacturers shall be consulted prior to applying any material.

The fire sprinkler, escutcheon and cover plate are designed to fit together without any adhesive. Escutcheons and cover plates can have gaps or spaces that are required to meet certain specification tolerances for activation of the sprinkler, but in most cases the escutcheons and cover plates should fit tightly to the wall or ceiling.

The intent of the IECC (Section R101.3) is not “intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.” When fire sprinklers are installed or required by other codes such as the IBC, they are installed according to those referenced standards. Fire sprinklers are installed by NFPA 13 (Standard for the Installation of Sprinkler Systems), NFPA 13R (Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height) and NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) along with IRC Section P2904.

These codes and standards require that all fire sprinklers, escutcheons and cover plates be listed and installed according to that listing. The testing and listing process (of fire sprinklers, escutcheons, and cover plates) does not take into account any additional field applied materials on the sprinkler, escutcheon and cover plate, such as: paint, caulk, drywall compound, and other construction materials. This prohibition is not only reiterated, but is enforced by NFPA 13 and NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) as both of these standards require full replacement of the affected components when found. When a fire sprinkler is properly installed, the escutcheon and/or cover plate should adequately seal the penetration.

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

C402.4.2-EC-HUGO. doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: Sprinkler systems provide a hole in the building thermal envelope that needs to be addressed somehow. If malfunction of the sprinkler system is possible the manufacturer of the system needs to specify an appropriate method.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeffrey M. Hugo, CBO, National Fire Sprinkler Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Fire Sprinklers	Where required, penetrations of the building envelope from concealed sprinklers shall be sealed according to the manufacturers installation instructions.

COMPONENT	CRITERIA
~~Automatic sprinkler systems~~	~~Penetrations of the building envelope from *Automatic sprinkler systems* installed according to the *International Residential Code*, *International Building Code and International Fire Code* are exempt from being sealed.~~

Commenter's Reason: This public comment is no longer asking for a blanket exception for all components of an automatic sprinkler system that penetrate the building envelope. The primary concern is the concealed sprinkler in the ceiling that penetrates the building envelope. There are two types of concealed sprinkler; pendent and sidewall. This public comment seeks to address both, since it is critical to life safety and property protection that when a concealed sprinkler is sealed that it be sealed according to the manufacturer's instructions and maintain its listings and approvals.

The primary purpose of this change stays the same, which is to prohibit field caulking or sealing of concealed sprinklers. Concealed sprinklers are popular for designers and architects as they are virtually hidden on the surface and cover plates can be colored to match decor. They are the most preferred sprinkler in many occupancies. Because of their makeup and function, when they are caulked or sealed in the field by using sealants, caulk or other methods, it impairs the operation of the sprinkler possibly causing delays in the operation of the sprinker, distorting the spray, or preventing the sprinkler from operating at all. Concealed sprinklers with foreign materials attached such as caulk, paint, sealants, foam, tape, etc are no longer considered compliant with their listing and approvals.

This public comment addresses the concealed sprinkler as "where required". It may not be necessary in testing the home to seal the concealed sprinklers due to their tight tolerance and minimal leakage.

Finally, this addition to the residential energy code is in place to assist those in the enforcing or constructing to the energy code that fire sprinklers are a critical life safety component in the IRC. In no way does the energy code permit fire sprinklers to impaired or installed contrary to the listing. Unlike commercial occupancies, where the NFPA 25 and fire code inspections are being performed on a frequent basis, residential occupancies covered by this code may never have a re-inspection to catch an impaired system.

Public Comment 2:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Concealed sprinklers	~~Where required, penetrations of the building envelope from concealed sprinklers shall be sealed according to the manufacturers installation instructions.~~ When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.

COMPONENT	CRITERIA
~~Automatic sprinkler systems~~	~~Penetrations of the building envelope from *Automatic sprinkler systems* installed according to the *International Residential Code*, *International Building Code and International Fire Code* are exempt from being sealed.~~

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This public comment is no longer asking for a blanket exception for all components of an automatic sprinkler system that penetrate the building envelope. The primary concern is the concealed sprinkler in the ceiling that penetrates the building envelope. There are two types of concealed sprinkler; pendent and sidewall. This public comment seeks to address both, since it is critical to life safety and property protection that when a concealed sprinkler is sealed that it be sealed according to the manufacturer's instructions and maintain its listings and approvals.

The primary purpose of this change stays the same, which is to prohibit field caulking or sealing of concealed sprinklers. Concealed sprinklers are popular for designers and architects as they are virtually hidden on the surface and cover plates can be colored to match decor. They are the most preferred sprinkler in many occupancies. Because of their makeup and function, when they are caulked or sealed in the field by using sealants, caulk or other methods, it impairs the operation of the sprinkler possibly causing delays in the operation of the sprinker, distorting the spray, or preventing the sprinkler from operating at all. Concealed sprinklers with foreign materials attached such as caulk, paint, sealants, foam, tape, etc. are no longer considered compliant with their listing and approvals.

This public comment addresses the concealed sprinkler as "where required". It may not be necessary in testing the home to seal the concealed sprinklers due to their tight tolerance and minimal leakage. A concealed sprinkler may only contribute up to 10 cfm, the same as a swinging door.

Finally, this addition to the residential energy code is in place to assist those in the enforcing or constructing to the energy code that fire sprinklers are a critical life safety component in the IRC. In no way does the energy code permit fire sprinklers to impaired or installed contrary to the listing. Unlike commercial occupancies, where the NFPA 25 and fire code inspections are being performed on a frequent basis, residential occupancies covered by this code may never have a re-inspection to catch an impaired system.

CE179-13, Part II

Final Action: AS AM AMPC____ D

CE180-13
Table C402.4.3

Proposed Change as Submitted

Proponent: Jeff Inks, Window & Door Manufacturers Association (jinks@wdma.com)

Revise as follows:

TABLE C402.4.3
MAXIMUM AIR INFILTRATION RATE
FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT^2)	TEST PROCEDURE
Fixed ~~W~~windows	0.20[a]	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Operable windows	0.30	
Sliding doors	~~0.20[a]~~ 0.30	
Swinging doors	~~0.20[a]~~ 0.50	
Skylights ~~– with condensation weepage openings~~	0.30	
~~Skylights – all others~~	~~0.20[a]~~	

(Portions of Table not shown remain unchanged)

For SI: 1 cubic foot per minute = 0.47L/s, 1 square foot = 0.093 m2.

~~a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).~~

Reason: During the last code development cycle as part of the comprehensive commercial revisions included in EC-147-09/10, air infiltration rates for windows, skylights, sliding doors and swinging doors were arbitrarily lowered without sound technical justification. Rather the only substantiation that was cited was debatable modeling which was said to show such reductions in air infiltration rates may improve performance by 1-2% in some types of commercial buildings and was not sufficiently comprehensive to justify lowering the rates to 0.20 cfm, especially for all types of commercial construction covered by the IECC. Other modeling can show gains are far less 1-2%.

Regardless of what modeling is used, the energy efficiency gains in the envelope and overall building efficiency as a result of the reduced rates are minimal at best and need to be more thoughtfully weighed against the negative impacts that result from them, primarily for operable fenestration which is the focus of this proposal. These include added costs to production, testing, and labeling for all products, increase in operational force (especially sliding fenestration products) which impairs operability for all users (and adds difficulty in meeting accessibility requirements) because of the additional sealing that would be required. In addition, the values also conflict with the values in AAMA/WDMA/CSA 101/I.S.2/A440.

In addition, if there are concerns that air infiltration rates for operable fenestration need to be made more stringent, they should be addressed in AAMA/WDMA/CSA 101/I.S.2/A440 and not in the body of the IECC.

For these reasons coupled with the minimal gains in building efficiency that may be achieved, we believe the reduction in air infiltration rates for operable fenestration is unjustified and unnecessary and that the rates should therefore be returned as proposed. It should be noted that this proposal maintains the air infiltration rate of 0.20 cfm for fixed windows.

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

C402.4.3-EC-INKS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal reduces stringency in the code and would put the IECC significantly out of agreement with ASHRAE 90.1. This would set up dueling manufacturing standards.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeff Inks, Window & Door Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.4.3
MAXIMUM AIR INFILTRATION RATE
FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT^2)	TEST PROCEDURE
Fixed Windows	0.20	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Operable windows	0.30	
Sliding doors	0.30	
Swinging doors	~~0.50~~ 0.30	
Skylights	0.30	
(remainder of table unchanged)	*(remainder of table unchanged)*	*(remainder of table unchanged)*

For SI: 1 cubic foot per minute = 0.47L/s, 1 square foot = 0.093 m2.

Commenter's Reason: This public comment amends the original proposal by reducing the maximum air infiltration permitted for swinging doors from 0.5 to 0.3 CFM/FT^2.

Regarding the original proposal as modified by this public comment, we are urging AMPC for the following reasons.

During the last code development cycle as part of the comprehensive commercial revisions included in EC-147-09/10, air infiltration rates for windows, skylights, sliding doors and swinging doors were arbitrarily lowered without sound technical justification. Rather the only substantiation that was cited was debatable modeling which was said to have shown that such reductions in air infiltration rates **may** improve performance by 1-2% in **some** types of commercial buildings. Sufficiently comprehensive data to justify lowering the fenestration rates to 0.20 cfm/ft^2, especially for **all** types of commercial construction covered by the IECC was not provided. Furthermore, other modeling can show gains are far less than the 1-2% reported for some types of commercial construction.

Regardless of what modeling is used, the energy efficiency gains in the envelope and overall building efficiency as a result of the reduced rates are minimal at best and need to be more thoughtfully weighed against the potential negative impacts, primarily for operable fenestration which is the focus of this proposal. (It should be noted that this proposal maintains the air infiltration rate of 0.20 cfm/ft^2 for fixed windows.)

These negative impacts include added costs to production, testing, and labeling for all products, and increases in operational force (especially sliding fenestration products) because of additional sealing which impairs operability for all users and adds further difficulty in meeting accessibility requirements. In addition, the rates also conflict with the rates set in the North American Fenestration Standard/Specification for Windows, Doors, and Skylights - AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS) which sets the rate at 0.30 cfm/ft^2 and is the fenestration standard relied upon by the I-codes.

The rates established in NAFS are the appropriate standard. If there are concerns that air infiltration rates for operable fenestration need to be made more stringent, they should be addressed in NAFS and not in the body of the IECC.

Regarding the committee's reason statement, while it can be argued that this proposal is a reduction in stringency from the 2012 edition, it will have very very little impact on the whole building energy performance which is why it should never have been reduced in the 2012 edition. As for concerns that restoring the more appropriate air infiltration rates of 0.30 cfm/ft^2 will put the IECC significantly out of agreement with ASHRAE 90.1, the two documents are already out of agreement in other areas, especially with respect to commercial fenestration requirements.

Finally, with respect to setting up dueling standards, that actually occurred when the reduced rates were approved for the 2012 edition in conflict with NAFS. This proposal eliminates the dueling standards that resulted from the 2012 revisions rather than creating them. NAFS is the standard that both the IECC and ASHRAE 90.1 should rely upon, and again, if there are concerns that air infiltration rates for operable fenestration need to be made more stringent, they should be addressed in NAFS and not in the body of the IECC.

For these reasons coupled with the minimal gains in building efficiency that may be achieved, we believe the reduction in air infiltration rates for operable fenestration is unjustified and unnecessary and that more appropriate rates should therefore be restored as proposed.

CE180-13

Final Action: AS AM AMPC____ D

CE183-13
C402.4.4

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies not within the scope of the fenestration assemblies covered in Section C402.4.3 shall ~~either meet the requirements of Section C402.4.3 or shall~~ be gasketed, weatherstripped or sealed.

> **Exception:** Door openings required to comply with Section 716 ~~or 716.4~~ of the *International Building Code*; or doors and door openings required to comply with UL 1784 by the International Building Code ~~to comply with UL 1784 shall not be required to comply with Section C402.4.4~~.

Reason: This proposal clarifies the components covered in the section on doors and access openings to shafts, chutes, stairways, and elevator lobbies are subject to air leakage provisions as components of the building thermal envelope, and provides a distinction between these doors and other doors that are already covered within the scope of fenestration assemblies. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Some doors are covered by Section C402.4.3 and the intent of the code should be that doors within the scope of fenestration that can be tested and listed *should* be tested and listed in accordance with and meet the provisions of Section C402.4.3. This leaves those doors that cannot be so tested and listed subject to the caulking and sealing criterion. This clarification is needed because the current code allows some doors that could (and should) be assessed as meeting the provisions of Section C402.4.3 through testing and listing only required to be "caulked or sealed." The exception is revised to provide clarification and to eliminate the ending statement—an exception by definition means something is not required to comply.

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

Anaysis: Section C402.4.4 of the IECC contains errata with respect to the sections of the IBC referenced in the exception. The proper references: 716 and 716.4 are shown in this code change proposal.

C402.4.4-EC-WILLIAMS.doc

Committee Action Hearing Results

Errata for this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: **Disapproved**

Committee Reason: Deleting reference to Section 716.4 is inappropriate.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies not within the scope of the fenestration assemblies covered in Section C402.4.3 shall be gasketed, weatherstripped or sealed.

> **Exception:** Door openings required to comply with Section 716 or 716.4 of the International Building Code; or doors and door openings required to comply with UL 1784 by the International Building Code.

Commenter's Reason: At the code development hearing, there was a singular point of opposition from the floor. A concern was raised about omitting the reference to Section 716.4 of the IBC, because it has a particular application to a certain type of door and access opening cover. The proponent asked for retention of Section 716.4 in the code change proposal as a floor modification, but the chair ruled that out of order. In the original change, DOE argued that by default, since Section 716.4 is a subsection of Section 716, it would automatically be referenced. The proposal, as originally submitted, was denied by a committee vote of 5 to 4.
This public comment simply retains the current reference in the code to Section 716.4. No other modifications to the code change proposal are proposed, because there was no opposing testimony on those parts of the code change proposal, and, as outlined in the original reason statement, they are relevant and appropriate in ensuring increased clarity of the code.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE183-13

Final Action: AS AM AMPC____ D

CE190-13
C402.4.7

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

<u>The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior of unconditioned vestibules shall comply with building envelope requirements. The building lobby shall not be considered a vestibule.</u>

Exceptions:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a<u>n</u> <u>atmospherically-separated</u> space less than 3,000 square feet (298 m^2) in area <u>that is not used as the entrance to areas of the building larger than 3000 square feet.</u>
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
7. <u>Building entrances in buildings that are less than four stories above grade and less than 10,000 square feet in area.</u>

Reason: This change clarifies the requirements for continuity of the building thermal envelope at vestibules (and that only the inner wall or the outer wall of the vestibule must comply). Exception 4 adds a phrase that is necessary to clarify that the exception does not apply to lobbies and similar building entrances. Exception 7 adds a new exception for very small buildings, because the vestibule could impose a disproportionate burden for them.

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

C402.4.7-EC-KRANZ.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the code should allow this as an owner option and not a requirement. They felt that the 'reserved area' concept is not workable over time. Residential use buildings should be exempted. Even if it is in an appendix, it needed to be acceptable code language.

Assembly Action: **Approved as Modified**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m^2) in area.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
7. Building entrances in buildings that are less than 10,000 (929 m^2) square feet in area.

Commenter's Reason: This Public Comment only changes the existing ICC code text by adding exception #7, eliminating the vestibule requirement for buildings smaller than 10,000 square feet.

Public Comment 2:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior of unconditioned vestibules shall comply with building envelope requirements. The building lobby shall not be considered a vestibule.

Exceptions:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m^2) in area that is not used as the entrance to a building larger than 3000 square feet.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

Commenter's Reason: Two significant issues are addressed in this comment: First – clarification for code officials and architects that only the inside or outside doors serving an unconditioned vestibule need to meet the energy code. Second – clarification that the building lobby is not a vestibule, even if smaller than 3,000 square feet. (The 3,000 square foot rule in exception 4 is clearly applicable to storefronts and small offices with doors directly to the street, but not to an elevator lobby or similar space that forms the main entrance into a large building.)

CE190-13

Final Action: AS AM AMPC____ D

CE191-13
C402.4.7

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used regularly to gain access to the building ~~by the public~~, such as doors to mechanical or electrical equipment rooms, or doors intended solely for emergency egress ~~employee use~~.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors ~~that open directly from a space~~ in buildings less than ~~3,000~~ 1,000 square feet (~~298~~ 100 m^2) in area.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, does not match the exceptions that are shown in the IECC. The current vestibule requirements are similar, but additional work has been done by SSPC 90.1. This change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction for buildings that now need vestibules that previously did not need them.

C402.4.7-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the justification provided that the change would align the IECC with ASHRAE 90.1 was not sufficient. They committee also felt reducing exception 4 to buildings of less than 1000 square feet was not appropriate.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Submitted.

Commenter's Reason: In response to the committee reason statements from the Committee Action Hearings:

Substantial cost analysis was done in order to optimize the stringency of vestibule requirements in each climate zone in Standard 90.1. The cost analysis considered available construction costs, estimated energy savings, Fuel prices ($1.22/therm for heating fuel costs and $0.0939 / kWh for electricity), a nominal escalation rate and fuel escalation rate of 3.7%, a Federal tax rate of 34%, a State tax rate of 5%, a Nominal discount rate of 7%, and a Nominal interest rate of 7%.
Using this criteria, SSPC 90.1 found the requirements in this proposal to be cost effective.

CE191-13
Final Action: AS AM AMPC____ D

CE192-13
C202 (NEW), C402.4.7, Chapter 5

<u>Proposed Change as Submitted</u>

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: <u>Vestibules are not required for the following:</u>

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m2) in area.
5. Revolving doors.
6. <u>Doors that have an installed air curtain that has been tested in accordance with ANSI/AMCA 220. Air curtains shall be controlled with the opening and closing of the door.</u>

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**AIR CURTAIN.** A device that generates and discharges a laminar air stream installed at the building entrance intended to prevent the infiltration of external, unconditioned air into the conditioned spaces, or the loss of interior, conditioned air to the outside.</u>

Add new standard to Chapter 5 as follows:

AMCA

<u>220-05 Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating.</u>

Reason: This code change will allow an air curtain to be used as a low cost, low maintenance alternative to a vestibule, thereby saving valuable floor space and creating an invisible, energy saving barrier when the door is open. An air curtain's base function requires nothing more than ambient air. Air curtains can save from 1-10% of the building energy use, depending on climate zone, building size, wind exposure and traffic volume. On average, an air curtain saves 60 - 80% of the energy lost through an open unprotected doorway, while consuming as little as 7.5% of that energy to operate. They require minimal annual maintenance (such as cleaning or vacuuming) and have a life expectancy of 15 to 25 years.

Air curtains installed on the interior of a building provides a coherent sheet of air created by an air stream and the surrounding entrained air. This sheet of air is able to bend and resist thermal exchange over an opening by way of support from the building's interior pressure and the stability created as the air stream meets a return grill or splits when it meets a surface, such as a floor, or another air stream.

An additional benefit of using an air curtain is a cleaner environment. They prevent the infiltration of dirt, fumes and debris and repel flying insects. They are approved for use in the food service industry as a means of insect control for customer entry doors, kitchen service, and delivery doors. They also have less of a propensity to be unintentional defeated like a vestibule, by common situations such as high traffic or being held open for egress.

Numerous studies have been published that evaluate the effectiveness of air curtains. When compared to that of a vestibule, air curtains consistently outperform vestibules in energy savings. Recent studies take advantage of current technology to evaluate the air curtains efficiencies and effectiveness.

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

Analysis: A review of the standard proposed for inclusion in the code, AMCA 220-05 Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Note: The term 'air curtain' is currently defined in the IgCC. The definition is the same as proposed here.

C402.4.7-EC-HICKMAN.doc

Committee Action Hearing Results

For staff analysis of the content of AAMCA 220-05 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Approved as Modified

Further modify the proposal as follows:

6. Doors that have an ~~installed~~ air curtain with a minimum velocity of 2 m/s at the floor, that has been tested in accordance with ANSI/AMCA 220 and installed in accordance with manufacturer's instructions. Air curtains shall be controlled with the opening and closing of the door.

(Portions of proposal not shown remain unchanged)

Committee Reason: Modification provides the technical minimum needed for the air curtain to function as intended as well as specifying manufacturer's installation instructions. The proposal adds an effective alternative to a constructed vestibule.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following*:*

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m2) in area.
5. Revolving doors.
6. Doors that have an air curtain with a minimum velocity of 2 m/s at the floor, ~~that has~~ have been tested in accordance with ANSI/AMCA 220 and installed in accordance with manufacturer's instructions. ~~Air curtains shall be controlled~~ Manual or automatic controls shall be provided that will operate the air curtain with the opening and closing of the door. Air curtains and their controls shall comply with Section C408.2.3.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This modification is to provide clarification to the modified approved language that came out of the committee hearings in Dallas. There were some words that seemed unnecessary and made the section hard to read. Also added to this proposal were control requirements to make the air curtains consistent with other systems regulated by this code. All systems, whether lighting or mechanical have control requirements that include functional performance testing.

CE192-13
Final Action: AS AM AMPC____ D

CE194-13

C202 (NEW), C402.1, C402.5 (NEW), C403.1, C403.5 (NEW), C403.6, C405.1, C405.10 (NEW)

Proposed Change as Submitted

Proponent: Tim Nogler, Washington Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C402.5.

C402.5 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. *Walk-in coolers*, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with all of the following:

1. Be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

   Exception: Automatic closers are not required for doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors, curtains, spring-hinged doors, or other method of minimizing infiltration when doors are open.

3. *Walk-in coolers* and *refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of not less than R–25 and *walk-in freezers* and *refrigerated warehouse freezers* shall contain wall, ceiling, and door insulation of not less than R–32.

   Exception: Glazed portions of doors or structural members need not be insulated.

4. *Walk-in freezers* shall contain floor insulation of not less than R–28.

5. Transparent reach-in doors for *walk-in freezers* and windows in *walk-in freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

6. Windows and transparent reach-in doors for *walk-in coolers* doors shall be of double-pane or triple-pane, inert gas-filled, heat-reflective treated glass.

C403.1 General. Mechanical systems and equipment serving the building heating, cooling, or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and either:

1. Section C403.3 (Simple systems); or
2. Section C403.4 (Complex systems).

Walk-in coolers, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with Section C403.5.

C403.5 Walk-in coolers, walk-in freezers, r**efrigerated warehouse coolers and refrigerated warehouse freezers.** *Walk-in coolers*, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with all of the following:

1. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall use electronically commutated motors, brushless direct current motors, or 3-phase motors.
2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.
3. Where anti-sweat heaters without anti-sweat heater controls are provided, they shall have a total door rail, glass, and frame heater power draw of not more than 7.1 Watts per square foot of door opening for *walk-in freezers*, and 3.0 Watts per square foot of door opening for *walk-in coolers*.
4. Where anti-sweat heater controls are provided, they shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

> **Exception:** Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps~~.~~. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C405.10.

C405.10 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. Lights in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall either use light sources with an efficacy of not less than 40 lumens per Watt, including ballast losses , or shall use light sources with an efficacy of not less than 40 lumens per Watt, including ballast losses , in conjunction with a device that turns off the lights within 15 minutes when the space is not occupied.

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of not less than 3,000 square feet.

REFRIGERATED WAREHOUSE FREEZER: An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of not less than 3,000 square feet.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of less than 3,000 square feet.

WALK-IN FREEZER: An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of less than 3,000 square feet..

Reason: Refrigeration is one of the largest unregulated electrical loads in buildings. This proposal provides basic minimum performance levels for walk-in coolers and freezers, and for refrigerated warehouse coolers and refrigerated warehouse freezers. The national model code should set a minimum performance for these significant energy using systems. This proposal is based on industry standard practice.

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

C402.1-EC-NOGLER.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concern about the option allowing clear glass in the doors of this equipment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Nogler, Washington State Building Code Council, requests Approval as Submitted.

Commenter's Reason: The committee expressed concern about the glazing in cooler and freezer enclosures fogging up. However, this proposal, based on industry practice, defines the required thermal quality of this glazing, which not only limits heat transfer but also limits interior condensation. Federal law contains criteria for walk-in coolers and walk-in freezers. Incorporation of these criteria will keep the IECC in compliance with Federal law. Also, without including these criteria, the baseline for tradeoffs or taking credit for insulation is not readily apparent. Designers, contractors, and building department staff would need to locate the information in the Federal register. Incorporating the criteria in the IECC eliminates the need to track down this information. This proposal provides a baseline for tradeoffs or for taking credit for additional insulation.

CE194-13
Final Action: AS AM AMPC____ D

CE198-13
C403.2.2

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.2 Equipment ~~and system~~ sizing. The output capacity of heating and cooling equipment ~~and systems~~ shall not exceed the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

Reason: This proposal clarifies intent that the provisions are written to apply to the output capacity of the equipment that provides heating or cooling functions.

While not defined, there is a distinct difference between systems and equipment. The equipment refers to the piece of equipment (or the appliance) that converts delivered energy into heating or cooling capability. The system is much broader in scope and includes not only the equipment but the distribution system, controls, etc. The design loads in Section C403.2.1 will cover the distribution system loads such that the loads in question and the point of comparison with size occurs at the output to the equipment.

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

C403.2.2-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal simplifies the code by putting the focus, where it should be, on equipment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.2 Equipment sizing. The output capacity of heating and cooling equipment shall not exceed the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment ~~and systems~~ provided with controls and devices that allow such ~~systems or~~ equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load

Commenter's Reason: As indicated in the original proposal, which received no opposing testimony at the first public hearing, there is a need to clarify that the provisions are written to apply to the output capacity of the equipment that provides heating or cooling functions. In preparing the code change, the reference to systems in the exception was missed, and should also be addressed so the exception is technically consistent with the provisions to which the exception applies.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE198-13

Final Action: AS AM AMPC____ D

CE200-13

Table C403.2.3(1), Table C403.2.3(2), Table C403.2.3(3), Table C403.2.3(8), Chapter 5

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.3(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE[a]
				~~Before 6/1/2011~~	~~As of 6/1/2011~~ Before 1/1/2016	As of 1/1/2016	
Air conditioners, air cooled	< 65,000 Btu/h[b]	All	Split System	~~13.0 SEER~~	13.0 SEER	13.0 SEER	AHRI 210/240
			Single Package	~~13.0 SEER~~	~~13.0~~ 14.0 SEER	14.0 SEER	
Through-the-wall (air cooled)	≤ 30,000 Btu/h[b]	All	Split system	~~12.0 SEER~~	12.0 SEER	12.0 SEER	
			Single Package	~~12.0 SEER~~	12.0 SEER	12.0 SEER	
Small-duct high-velocity (air cooled)	< 65,000 Btu/h[b]	All	Split System	~~10.0 SEER~~	~~10.0~~ 11.0 SEER	11.0 SEER	
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.2 EER~~ ~~11.4 IEER~~	11.2 EER 11.4 IEER	11.2 EER 12.8 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	11.0 EER 11.2 IEER	11.0 EER 12.6 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	11.0 EER 11.2 IEER	11.0 EER 12.4 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	10.8 EER 11.0 IEER	10.8 EER 12.2 IEER	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~10.0 EER~~ ~~10.1 IEER~~	10.0 EER 10.1 IEER	10.0 EER 11.6 IEER	
		All other	Split System and Single Package	~~9.8 EER~~ ~~9.9 IEER~~	9.8 EER 9.9 IEER	9.8 EER 11.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~9.7 EER~~ ~~9.8 IEER~~	9.7 EER 9.8 IEER	9.7 EER 11.2 IEER	
		All other	Split System and Single Package	~~9.5 EER~~ ~~9.6 IEER~~	9.5 EER 9.6 IEER	9.5 EER 11.0 IEER	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE[a]
				~~Before 6/1/2011~~	~~As of 6/1/2011~~ Before 1/1/2016	As of 1/1/2016	
Air conditioners, water cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.5 EER~~ ~~11.7 IEER~~	12.1 EER 12.3 IEER	12.1 EER 13.9 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.3 EER~~ ~~11.5 IEER~~	11.9 EER 12.1 IEER	11.9 EER 13.7 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	12.5 EER 12.5 IEER	12.5 EER 13.9 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	12.3 EER 12.5 IEER	12.3 EER 13.7 IEER	
	≥ 240,000 Btu/h And < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.1 IEER~~	12.4 EER 12.6 IEER	12.4 EER 13.6 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~10.9 IEER~~	12.2 EER 12.4 IEER	12.2 EER 13.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.1 IEER~~	12.2 EER 12.4 IEER	12.2 EER 13.5 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~10.9 IEER~~	12.0 EER 12.2 IEER	12.0 EER 13.3 IEER	
Air conditioners, evaporatively cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.5 EER~~ ~~11.7 IEER~~	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.3 EER~~ ~~11.5 IEER~~	11.9 EER 12.1 IEER	11.9 EER 12.1 IEER	
	< 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	12.0 EER 12.2 IEER	12.0 EER 12.2 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	11.8 EER 12.0 IEER	11.8 EER 12.0 IEER	
	< 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 ERR~~ ~~11.1 ERR~~	11.9 ERR 12.1 IERR	11.9 ERR 12.1 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~10.9 EER~~	~~12.2~~ 11.7 ERR 11.9 IEER	11.7 ERR 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 ERR~~ ~~11.1 EER~~	11.7 ERR 11.9 ERR	11.7 ERR 11.9 ERRT	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE[a]
				~~Before 6/1/2011~~	~~As of 6/1/2011~~ Before 1/1/2016	As of 1/1/2016	
		All other	Split System and Single Package	~~10.8 ERR~~ ~~10.9 ERR~~	11.5 ERR 11.7 ERR	11.5 ERR 11.7 ERR	
Condensing units, air cooled	≥ 135,000 Btu/h			~~10.1 EER~~ ~~11.4 IEER~~	10.5 EER ~~14.0~~ 11.8 IEER	10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			~~13.1 EER~~ ~~13.6 IEER~~	13.5 EER 14.0 IEER	13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			~~13.1 EER~~ ~~13.6 IEER~~	13.5 EER 14.0 IEER	13.5 EER 14.0 IEER	

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.2.3(2)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
Air cooled (cooling mode)	< 65,000 Btu/h[b]	All	Split System	~~13.0~~ 14.0 SEER	14.0 SEER	AHRI 210/240
			Single Packaged	~~13.0~~ 14.0 SEER	14.0 SEER	
Through-the-wall, air cooled	≤ 30,000 Btu/h[b]	All	Split System	~~13.0~~ 12.0 SEER	12.0 SEER	
			Single Packaged	~~13.0~~ 12.0 SEER	12.0 SEER	
Single-duct high-velocity air cooled	< 65,000 Btu/h[b]	All	Split System	~~10.0~~ 11.0 SEER	11 SEER	
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 12.0 IEER	AHRI 340/360
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 11.8 IEER	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY Before 1/1/2016	MINIMUM EFFICIENCY As of 1/1/2016	TEST PROCEDURE[a]
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.6 EER 10.7 IEER	10.6 EER 11.6 IEER	
		All other	Split System and Single Package	10.4 EER 10.5 IEER	10.4 EER 11.4 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 10.6 IEER	
		All other	Split System and Single Package	9.3 EER 9.4 IEER	9.3 EER 10.4 IEER	
~~Water source (cooling mode)~~	~~< 17,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~11.2 EER~~		~~ISO 13256-1~~
	~~≥ 17,000 Btu/h and < 65,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~12.0 EER~~		
	~~≥ 65,000 Btu/h and < 135,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~12.0 EER~~		
~~Ground water source (cooling mode)~~	~~< 135,000 Btu/h~~	~~All~~	~~59°F entering water~~	~~16.2 EER~~		
		~~All~~	~~77°F entering water~~	~~13.4 EER~~		
~~Water-source water to water (cooling mode)~~	~~< 135,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~10.6 EER~~		~~ISO 13256-2~~
			~~59°F entering water~~	~~16.3 EER~~		
~~Ground water source Brine to water (cooling mode)~~	~~< 135,000 Btu/h~~	~~All~~	~~77°F entering fluid~~	~~12.1 EER~~		
~~Air cooled (heating mode)~~	~~< 65,000 Btu/h[b]~~	—	~~Split System~~	~~7.7 HSPF~~		~~AHRI 210/240~~
		—	~~Single Package~~	~~7.7 HSPF~~		

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
~~Through-the-wall, (air cooled, heating mode)~~	~~≤ 30,000 Btu/h[b] (cooling capacity)~~	—	~~Split System~~	~~7.4 HSPF~~		
		—	~~Single Package~~	~~7.4 HSPF~~		
~~Small-duct high velocity (air cooled, heating mode)~~	~~< 65,000 Btu/h[b]~~	—	~~Split System~~	~~6.8 HSPF~~		
~~Air cooled (heating mode)~~	~~≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)~~	~~—~~	~~47ºF db/43ºF wb Outdoor Air~~	~~3.3 COP~~		~~AHRI 340/360~~
			~~17ºF db/15ºF wb Outdoor Air~~	~~2.25 COP~~		
	~~≥ 135,000 Btu/h (cooling capacity)~~	—	~~47ºF db/43ºF wb Outdoor Air~~	~~3.2 COP~~		
			~~17ºF db/15ºF wb Outdoor Air~~	~~2.05 COP~~		
~~Water source (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~68°F entering water~~	~~4.2 COP~~		~~ISO 13256-1~~
~~Ground water source (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~50°F entering water~~	~~3.6 COP~~		
~~Ground source (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~32°F entering fluid~~	~~3.1 COP~~		
~~Water-source water to water (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~68°F entering water~~	~~3.7 COP~~		~~ISO 13256-2~~
		—	~~50°F entering water~~	~~3.1 COP~~		
~~Ground source brine to water (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~32°F entering fluid~~	~~2.5 COP~~		
Water to Air: Water Loop (cooling mode)	<17,000 Btu/h	All	86 °F entering water	12.2 EER	12.2 EER	ISO 13256-1

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
	≥17,000 Btu/h and <65,000 Btu/h	All	86 °F entering water	13 EER	13 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	86 °F entering water	13 EER	13 EER	
Water to Air: Ground Water (cooling mode)	<135,000 Btu/h	All	59 °F entering water	18.0 EER	18.0 EER	ISO 13256-1
Brine to Air: Ground Loop (cooling mode)	<135,000 Btu/h	All	77 F entering water	14.1 EER	14.1 EER	ISO 13256-1
Water to Water: Water Loop (cooling mode)	<135,000 Btu/h	All	86 °F entering water	10.6 EER	10.6 EER	ISO-13256-2
Water to Water: Ground Water (Cooling Mode)	<135,000 Btu/h	All	59 °F entering water	16.3 EER	16.3 EER	
Brine to Water: Ground Loop (cooling mode)	<135,000 Btu/h	All	77 °F entering water	12.1 EER	12.1 EER	
Air cooled (heating mode)	<65,000 Btu/h[b]	—	Split System	8.2 HSPF	8.2 HSPF	AHRI 210/240
		—	Single Package	8.0 HSPF	8.0 HSPF	
Through-the-wall, (air cooled, heating mode)	≤30,000 Btu/h[b] (cooling capacity)	—	Split System	7.4 HSPF	7.4 HSPF	
		—	Single Package	7.4 HSPF	7.4 HSPF	
Small-Duct high velocity (air cooled, heating mode)	<65,000 Btu/h[b]	—	Split System	6.8 HSPF	6.8 HSPF	
Air Cooled (Heating Mode)	≥65,000 Btu/h and <135,000 Btu/h (Cooling Capacity)	—	47ºF db/43ºF wb Outdoor Air	3.3 COP	3.3 COP	AHRI 340/360
			17ºF db/15ºF wb Outdoor Air	2.25 COP	2.25 COP	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	**As of 1/1/2016**	
	≥135,000 Btu/h (Cooling Capacity)	—	47ºF db/43ºF wb Outdoor Air	3.2 COP	3.2 COP	
			17ºF db/15ºF wb Outdoor Air	2.05 COP	2.05 COP	
Water to Air: Water Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	68 °F entering water	4.3 COP	4.3 COP	ISO 13256-1
Water to Air Ground Water (heating mode)	<135,000 Btu/h (cooling capacity)	—	50 °F entering water	3.7 COP	3.7 COP	
Brine to Air: Ground Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	32 °F entering fluid	3.2 COP	3.2 COP	
Water to Water: Water Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	68 °F entering water	3.7 COP	3.7 COP	ISO 13256-2
Water to Water: Ground Water (heating mode)	<135,000 Btu/h (cooling capacity)	—	50 °F entering water	3.1 COP	3.1 COP	
Brine to Water: Ground Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	32 °F entering fluid	2.5 COP	2.5 COP	

For SI: 1 British thermal unit per hour = 0.2931 W. ^{o}C = [(^{o}F) – 32]/1.8

a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.2.3(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
			~~Before 10/08/2012~~	~~As of 10/08/2012~~	
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	~~12.5 - (0.213 × Cap/1000) EER~~	~~13.8 - (0.300 × Cap/1000) EER~~ 14.0 – (0.300 × Cap/1000)[c] EER	AHRI 310/380
PTAC (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	~~10.9 - (0.213 × Cap/1000) EER~~	10.9 - (0.213 × Cap/1000) EER	
PTHP (cooling mode) new construction	All Capacities	95°F db outdoor air	~~12.3 - (0.213 × Cap/1000) EER~~	14.0 - (0.300 × Cap/1000) EER	
PTHP (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	~~10.8 - (0.213 × Cap/1000) EER~~	10.8 - (0.213 × Cap/1000) EER	
PTHP (heating mode) new construction	All Capacities	—	~~3.2 - (0.026 × Cap/1000) COP~~	3.2 - (0.026 × Cap/1000) COP	
PTHP (heating mode) replacements[b]	All Capacities	—	~~2.9 - (0.026 × Cap/1000) COP~~	2.9 - (0.026 × Cap/1000) COP	
SPVAC (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	~~9.0 EER~~	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.9 EER~~	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.6 EER~~	8.6 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	~~9.0 EER~~	9.0 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.9 EER~~	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.6 EER~~	8.6 EER	
SPVHP (heating mode)	<65,000 Btu/h	47°F db/ 43°F wb outdoor air	~~3.0 COP~~	3.0 COP	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	47°F db/ 43°F wb outdoor air	~~3.0 COP~~	3.0 COP	

	≥ 135,000 Btu/h and < 240,000 Btu/h	47°F db/ 75°F wb outdoor air	~~2.9 COP~~	2.9 COP	
Room air conditioners, with louvered slides	< 6,000 Btu/h	—	~~9.7 SEER~~	9.7 SEER	ANSI/AHAM RAC-1
	≥ 6,000 Btu/h and < 8,000 Btu/h	—	~~9.7 EER~~	9.7 EER	
	≥ 8,000 Btu/h and < 14,000 Btu/h	—	~~9.8 EER~~	9.8 EER	
	≥ 14,000 Btu/h and < 20,000 Btu/h	—	~~9.7 SEER~~	9.7 SEER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
Room air conditioners, with louvered slides	< 8,000 Btu/h	—	~~9.0 EER~~	9.0 EER	
	≥ 8,000 Btu/h and < 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
Room air-conditioner heat pumps with louvered sides	< 20,000 Btu/h	—	~~9.0 EER~~	9.0 EER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
Room air-conditioner heat pumps without louvered sides	< 14,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
	≥ 14,000 Btu/h	—	~~8.0 EER~~	8.0 EER	
Room air conditioner casement only	All capacities	—	~~8.7 EER~~	8.7 EER	
Room air conditioner casement-slider	All capacities	—	~~9.5 EER~~	9.5 EER	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

"Cap" = The rated cooling capacity of the project in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations

a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Replacement unit shall be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY: NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) in height and less than 42 inches (1067 mm) in width.

TABLE C403.2.3(8)
MINIMUM EFFICIENCY REQUIREMENTS:
HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[i]	PERFORMANCE REQUIRED[b, c, d, g, h]	TEST PROCEDURE[e, f]
Propeller or axial fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	~~≥38.2~~ ≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F *entering wb*	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F *entering wb*	≥ 110,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F *entering wb*	≥ 157,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F *entering wb*	≥ 135,000 Btu/h·hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature ~~R-22 Test Fluid~~ 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering db	≥ 176,000 Btu/h·hp	ARI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7)
db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. The efficiencies and test procedures for both open and closed circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.
b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate rated motor power.
c. For purposes of this table, closed circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate rated motor power and the spray pump nameplate rated motor power.
d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.
e. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field erected cooling towers.
f. If a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program, or, if a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.
g. All cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project specific accessories and / or options included in the capacity of the cooling tower
h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power
I. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed above with R-507A as the test fluid.

Add new standards as follows:

CTI

ATC 105S-11 Acceptance Test Code for Closed Circuit Cooling Towers
ATC 106-11 Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers

Reason: For consistency with Standard 90.1. This proposal contains all of the increased equipment efficiency requirements found in standard 90.1. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1.

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

Analysis: A review of the standard proposed for inclusion in the code, CTI -ATC 105S-2011 Acceptance Test Code for Closed Circuit Cooling Towers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.
A review of the standard proposed for inclusion in the code, CTI-ATC 106-2011 Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C403.2.3(1)T-EC-FERGUSON.doc

Committee Action Hearing Results

For staff analysis of the content of ATC 105S-11 and ATC 106-11 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The proposal updates the equipment efficiencies to federal minimum provisions and those contained in ASHRAE 90.1.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C403.2.3(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

Air conditioners air cooled	<65,000 Btu/h[b]	All	Split System	13 SEER	13 SEER	AHRI 210/240
			Single Package	13 ~~14~~ SEER[c]	14 SEER[c]	

c. Minimum efficiency as of 1/1/2015".

(Portions of code change proposal not remain unchanged)

TABLE C403.2.3(2)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

Air cooled (cooling mode)	<65,000 Btu/h[b]	All	Split System	13 ~~14~~ SEER[c]	~~13~~14.0 SEER[c]	AHRI 210/240
			Single Package	13 ~~14~~ SEER[c]	14,0 SEER[c]	
Air cooled (heating mode)	<65,000 Btu/h[b]	-	Split System	~~8.2~~7.7 HSPF[c]	8.2 HSPF[c]	AHRI 210/240
			Single Package	~~8.0~~7.7 HSPF[c]	8.0 HSPF[c]	

c. Minimum efficiency as of 1/1/2015”..

(Portions of code change proposal not remain unchanged)

TABLE C403.2.3(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

PTAC (cooling mode) New Construction	All Capacities	95 F db outdoor air	Split System Single Package		14.0 – (0.300 × Cap/1000) EER [c]	AHRI 310/380

c. Before 1/1/2015 the minimum efficiency shall be13.8 – (0.300 × Cap/1000) EER

Commenter’s Reason: *On June 27, 2011, the Department of Energy (DOE) issued a final rule amending the federal minimum energy efficiency standards for the single-phase residential central air conditioners and heat pumps. This proposal harmonizes the minimum energy efficiencies of three-phase air-cooled commercial air conditioners and heat pumps less than 65,000 Btu/h with the efficiencies adopted by DOE for residential central air conditioners. The new SEERs and HSPFs will become effective on January 1, 2015.*

The current format of the table has a date of January 1, 2016 as the switchover date for all equipment efficiencies (where applicable),due to the formatting, it’s difficult to add a new column for the few efficiencies that go into effect on January 1, 2015.This proposes to add a footnote indicating those efficiencies go into effect a year earlier.

CE200-13
Final Action: AS AM AMPC____ D

CE201-13
C202 (NEW), Table 403.2.3(9) (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new Table as follows:

TABLE C403.2.3 (9)
MINIMUM EFFICIENCY AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS

Equipment Type	Net Sensible Cooling Capacity[a]	MinimumSCOP-127[b] Efficiency Downflow units / Upflow units	Test Procedure
Air conditioners, air cooled	65,000 Btu/h	2.20 / 2.09	ANSI/ASHRAE 127
	≥65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥240,000 Btu/h	1.90 / 1.79	
Air conditioners, water cooled	65,000 Btu/h	2.60 / 2.49	
	≥65,000 Btu/h and < 240,000 Btu/h	2.50 / 2.39	
	≥240,000 Btu/h	2.40 /2.29	
Air conditioners, water cooled with fluid economizer	65,000 Btu/h	2.55 /2.44	
	≥65,000 Btu/h and < 240,000 Btu/h	2.45 / 2.34	
	≥240,000 Btu/h	2.35 / 2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	65,000 Btu/h	2.50 / 2.39	
	≥65,000 Btu/h and < 240,000 Btu/h	2.15 / 2.04	
	≥240,000 Btu/h	2.10 / 1.99	
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	65,000 Btu/h	2.45 / 2.34	
	≥65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥240,000 Btu/h	2.05 / 1.94	

a. Net sensible cooling capacity: The total gross cooling capacity less the latent cooling less the energy to the air movement system. (Total Gross – latent – Fan Power)
b. Sensible coefficient of performance (SCOP-127): a ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding re-heaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data and that has a design electronic data equipment power density exceeding 20 watts/ft^2 of *conditioned floor area*.

Add new standard to Chapter 5 as follows:

ASHRAE

127-07 Method of Testing for Raining Computer and Data Processing Room Unitary Air Conditioners

Reason: Computer rooms, due to the unique nature of the space, have a significant level of internal heat generation that must be addressed to ensure the equipment therein functions properly. This generally "trumps" any consideration of the sensible or latent loads associated with the people in the space. The cooling equipment that addresses the loads associated with these spaces operates differently and responds to different loads and schedules. This necessitates the efficiency of such equipment be addressed differently than more traditional cooling equipment. ANSI/ASHRAE Standard 127 has been developed for use in measuring and expressing the performance of this equipment for this particular and unique application. This equipment is currently addressed by ASHRAE/IES 90.1-2010, which is adopted as an alternative means of compliance with the IECC. This proposed change addresses the need to cover this unique energy efficiency opportunity in a manner consistent with 90.1-2010. Without this change the IECC Commercial Provisions could not be deemed equivalent to 90.1-2010 or subsequent editions of 90.1 that retain these provisions. More importantly if this change is not approved then the equipment efficiency provisions currently in the IECC would continue to be applied to equipment serving such spaces inappropriately

Cost Impact: The code change proposal will increase the cost of construction as there were previously no requirements for this equipment.

Analysis: A review of the standard proposed for inclusion in the code, ASHRAE 127-2007 Method of Testing for Raining Computer and Data Processing Room Unitary Air Conditioners, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C403.2.3(9)T-EC-FERGUSON.doc

Committee Action Hearing Results

For staff analysis of the content of ASHRAE 127-07 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Approved as Submitted

Committee Reason: Computer rooms develop substantial heat and need specific air-conditioning equipment. The proposal would establish minimum efficiencies for these systems. A public comment is needed to provide a reference to this table within the requirements of the chapter.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.3 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.2.3(1), C403.2.3(2), C403.2.3(3), C403.2.3(4), C403.2.3(5), C403.2.3(6), C403.2.3(7), ~~and~~ C403.2.3(8) and C403.2.3(9) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table ~~C403.2.3(9)~~ C403.2.3(10). The efficiency shall be verified through certification under an *approved* certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The original proposal adds important criteria for the limitation of energy usage in computer rooms. It adds another equipment table in the pantheon of C403.2.3 tables. What it fails to do is provide a reference to such table in the text. The proposed modification simply cleans up the proposal by adding reference to it in Section C403.2.3.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE201-13

Final Action: AS AM AMPC____ D

CE212-13
C403.2.6

Proposed Change as Submitted

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

Revise as follows:

C403.2.6 Energy recovery ventilation systems. Where the supply airflow rate of a fan system exceeds the values specified in Table C403.2.6, the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4

Exception: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:
   - 2.1. Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values <u>except when higher volumes are required to maintain safe operating conditions</u>.
   - 2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.2.6
10. <u>Systems exhausting toxic, flammable, paint, or corrosive fumes or dust.</u>
11. <u>Commercial kitchen hoods used for collecting and removing grease vapors and smoke</u>.

Reason: Public health, safety and welfare takes precedence over reducing energy consumption, and the revision to Item 2.1 recognizes that with laboratory fume hoods. Additional exceptions 10 and 11 identify systems where energy recovery should not be used because what is being exhausted could be detrimental or destructive to any energy recovery equipment. All of these provisions are contained in the current Minnesota Commercial Energy Code.

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

C403.2.6-EC-MANZ.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds systems to the list of exceptions for which energy recovery systems would be inappropriate because the things being vented are dangerous or toxic. The committee identified that the change to Item 2.1 needs to be revised. It provides an exception within an exception and is unclear.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.6 Energy recovery ventilation systems. Where the supply airflow rate of a fan system exceeds the values specified in Table C403.2.6, the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4

Exceptions: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code.*
2. Laboratory fume hood systems that include at least one of the following features:
   - 2.1 Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent of less of design values. ~~except when higher volumes are required to maintain safe operating conditions.~~
   - 2.2 Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor eating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.2.6
10. Systems exhausting toxic, flammable, paint, or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

Commenter's Reason: The term "safe operating conditions" is not defined and would be open to interpretation. The addition to Exception 2.1, which is currently included in the 2012 IECC, would weaken the provision as designers could claim the need for additional air volumes which would increase energy use. Without a threshold built into the code provision it would be difficult to make determination as to what was safe or not safe relating to operating conditions.

CE212-13
Final Action: AS AM AMPC____ D

CE214-13
Table C403.2.6

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.6
ENERGY RECOVERY REQUIREMENT

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥10% and <20%	**≥20% and <30%**	**≥ 30% and < 40%**	**≥ 40% and < 50%**	**≥ 50% and < 60%**	**≥ 60% and < 70%**	**≥ 70% and < 80%**	**≥ 80%**
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	~~≥5000~~ NR	~~≥5000~~ NR
1B, 2B, 5C	NR	NR	NR	NR	≥26000	≥12000	≥5000	≥4000
6B	≥28000	≥26500	≥11000	≥5500	≥4500	≥3500	≥2500	≥1500
1A, 2A, 3A, 4A, 5A, 6A	≥26000	≥16000	≥5500	≥4500	≥3500	≥2000	≥1000	> 0
7, 8	≥4500	≥4000	≥2500	≥1000	> 0	> 0	> 0	> 0

NR = not required

Reason: This proposal revises the requirements for the use of exhaust air energy recovery as defined in table C403.2.6

The current table requires energy recovery as a function of the percent outdoor air and design supply fan airflow. The current table defines requirements for energy recover for outdoor air ventilation rates above 30%. Many buildings operate with ventilation rates below 30%. Typical buildings in this category include offices, motels, hotels, grocery, and warehouses which represent a significant part of the market. Therefore by extending the table down we can save additional energy on these buildings where economically justified. SSPC 90.1 ran full 8760 hr simulation runs for building office, school and retail applications down to 10% outdoor air and then selected least restrictive cfm values for the table based on the 2010 scalar ratio metholody using a design life of 15 years. This results in additional requirements for energy recovery on larger systems in zones 1A, 2A, 3A, 4A, 5A, 6A, 7 and 8. These zones represent 30.8% of the market.

In addition to the changes to extend the table down low percent outdoor air ventilation rates, this also proposes to modify the requirements for zone 3B, 3C, 4B, 4C and 5B as they are not economical justified and have scalar values of 20.3 yrs up to infinity. We have received feedback that other studies have also confirmed that these values are not cost effective and it is felt these values need to be corrected.

The change ensures continued consistency between the IECC and Standard 90.1.

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

C403.2.6-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: These categories allow for cost effective application of energy recovery and should be included in the requirement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C403.2.6 (1)

ENERGY RECOVERY REQUIREMENT (ventilation systems operating <8000 hr/yr)

(Portions of code change proposal not shown remain unchanged)

TABLE C403.2.6 (2) Energy Recovery Requirement (ventilation systems operating ≥8000 hrs/yr)

Zone	% *Outdoor Air* at Full Design Airflow Rate							
	≥10% and <20%	≥20% and <30%	≥30% and <40%	≥40% and <50%	≥50% and <60%	≥60% and <70%	≥70% and <80%	≥80%
	Design Supply Fan Airflow Rate (cfm)							
3C	NR	NR	NR	NR	NR	NR	NR	NR
1B, 2B, 3B, 4C, 5C	NR	≥19500	≥9000	≥5000	≥4000	≥3000	≥1500	>0
1A, 2A, 3A, 4B, 5B	≥2500	≥2000	≥1000	≥500	>0	>0	>0	>0
4A, 5A, 6A, 6B, 7, 8	>0	>0	>0	>0	>0	>0	>0	>0

NR – Not required

Commenter's Reason: In 2012 addendum BT to 90.1 2010 standard was developed to expand the range for the use of exhaust air energy recovery down to 10% rates ventilation rate, which was matched in the original CE214. At that time the requirements were adjusted based on the latest performance and economics analysis and energy recovery was removed for climate zones 3B, 3C, 4B, 4C, and 5B for >70% outside
air.

This modification will modification will make the IECC consistent with the latest addenda to ASHRAE 90.1 that will be published in the 2013 version of the standard.

Additional studies have been completed for buildings with continuous ventilation operation (assumed to be ≥8,000 hrs) and a second table has been developed to cover buildings with the higher ventilation operation which expands the requirements for the use of energy recovery.

CE214-13

Final Action: AS AM AMPC____ D

CE215-13
C403.2.7

Proposed Change as Submitted

Proponent: Ron Burton, PTW Advisors, LLC, representing BOMA International (ronburton@ptwadvisors.com)

Revise as follows:

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by minimum of R-8 insulation.

Exceptions:

1. Where located within equipment
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15° F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

<u>**Exception:** Ducts and plenums located completely inside the building thermal envelope</u>

Reason: To provide and exception to not require insulation on ducts and plenums, when the ducts and plenums are completely inside the building thermal envelope. This is the same as the provision already allowed in the residential portion of the code. Heat loss or gain from the ducts and plenums inside the conditioned space is only released to the conditioned area and thus does not have an impact on energy use.

Cost Impact: This code change proposal will not increase the cost of construction. The change will have a cost savings by exempting the required insulation on ducts and plenums.

C403.2.7-EC-BURTON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal may result in conflicts with the *International Mechanical Code.* The text was unclear whether it meant ducts and plenums located within the walls, floor and ceilings which constitute the building thermal envelope, or if it meant to apply to those that would be located within the conditioned space created by the assemblies which create the thermal envelope.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ron Burton, PTW Advisors, LLC, representing Building Owners and Managers Association (BOMA), International requests Approval as Modified by this Public Comment.

Modify the proposal as follows:
C403.2.7 Duct and plenum insulation and sealing. All supply and return ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the buildings. Where located within the building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by minimum of R-8 insulation.

Exceptions:

1. Where located within equipment
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15^{o} F (8^{o} C).
3. Where located inside of the conditioned space within the building thermal envelope.

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall be comply with Section 603.9 of the *International Mechanical Code.*

~~**Exception:** Ducts and plenums located completely inside the building thermal envelope.~~

Commenter's Reason: To respond to the committee concern that the exception would conflict with the *International Mechanical Code* and to clarify the committee concern about unclear language as to the location of the ducts in relationship to the building thermal envelope. The intent is to provide and exception to the requirement for duct and plenum insulation when the ducts are entirely within the conditioned space created by the building envelope. The same exception currently exists in the IECC residential portion of the code.

CE215-13
Final Action: AS AM AMPC____ D

CE220-13
C403.2.7 (NEW), Table C403.2.7 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.7 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not exceed 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space containing a kitchen hood shall not exceed the greater of the ventilation rate required to meet the space heating or cooling load or the hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.
When total kitchen hood exhaust airflow rate is greater than 5,000 cfm each hood shall have a maximum exhaust rate in accordance with Table C403.2.7 and shall meet one of the following:

1. At least 50 percent of all replacement air is transfer air that would otherwise be exhausted.
2. Demand ventilation systems on at least 75 percent of the exhaust air that are capable of at least 50 percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of at least 40 percent on at least 50 percent of the total exhaust airflow.

When a single hood, or hood section, is installed over appliances with different duty ratings, then the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: When at least 75 percent of all the replacement air is transfer air that would otherwise be exhausted

TABLE C403.2.7
MAXIMUM NET EXHAUST FLOW RATE, CFM PER LINEAR FOOT OF HOOD LENGTH

Type of Hood	Light Duty Equipment	Medium Duty Equipment	Heavy Duty Equipment	Extra Heavy Duty Equipment
Wall-mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	Not allowed	Not allowed
Backshelf/Pass-over	210	210	280	Not allowed

Reason: For consistency with Standard 90.1-2010. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IESNA Standard 90.1-2010.

The proposal basically outlaws "short-circuit" hoods.

Research and California Energy Commission has shown that direct supply of makeup air, in excess of 10% of hood exhaust airflow, into the hood cavity significantly deteriorates the Capture and Containment (C&C) performance of hoods. This research has also demonstrated that short-circuit hoods waste energy and degrade kitchen environment and hygiene. If we assume a generic baseline C&C rate for a cooking process, studies show the exhaust rates for short-circuit hoods generally exceed those for exhaust-only hoods by at least the amount of air short-circuited, thus decreasing performance and increasing energy consumption.

Engineers are often in the habit of simply providing makeup air units in kitchens to provide makeup air equal to the exhaust flow rate even when "free" transfer air is available from adjacent spaces. Adding makeup air when transfer air is available is a wasteful design practice and should be prohibited. Using available transfer air saves energy and reduces the first cost of the makeup unit and exhaust system in the adjacent spaces. It simply requires some engineering and coordination to provide a path for the transfer air. The proposed change is also intended to get rid of a wasteful common practice: specifying excessive exhaust airflow by selecting hoods that are not listed or have not been subjected to a recognized performance test. The exhaust airflow flow rates in Table C403.2.7 are 30% below the minimum airflow rates in ASHRAE Standard 154-2003.

ASHRAE Research Project 1202 shows that hoods listed per UL Standard 710 and/or are engineered and tested per ASTM/ANSI 1704 have exhaust rates that are at least 30% less than the exhaust airflow requirements for unlisted or untested hoods. The intent is to conserve energy through the use of engineered hoods or performance based hoods that have been validated based on consensus standard test methods it should be noted that ASHRAE research has not demonstrated that exhaust rate reductions substantially beyond the 30% can or should be recommended at this time. This requirement should not increase first cost and in many cases will reduce first cost through downsizing of exhaust, supply and cooling equipment.

The 5,000 CFM threshold recognizes small restaurants. In addition makeup air can be fully conditioned. As a result there are now cost effective opportunities to reduce energy with demand ventilation systems or energy recovery devices.

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

C403.2.7 (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee recognized that there is significant potential for energy savings, but expressed concern that these systems are already difficult to balance properly without this added challenge. The proposal needs better coordination with the *International Mechanical Code*.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.7 Kitchen Exhaust Systems. Replacement air introduced directly into the exhaust hood cavity shall not exceed 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space containing a kitchen hood shall not exceed the greater of the ventilation rate required to meet the space heating or cooling load or the hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

When total kitchen hood exhaust airflow rate is greater than 5,000 cfm, each hood shall <u>be a factory-built commercial exhaust hood listed by a nationally recognized testing laboratory to comply with the requirements of UL710. Each hood shall </u>have a maximum exhaust rate in accordance with Table C403.2.7 and shall meet one of the following:

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This will make the IECC consistent with 90.1-2010 and 90.1-2013. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IESNA Standard 90.1-2010.
The proposal basically outlaws "short-circuit" hoods.
Research and California Energy Commission has shown that direct supply of makeup air, in excess of 10% of hood exhaust airflow, into the hood cavity significantly deteriorates the Capture and Containment (C&C) performance of hoods. This research has also demonstrated that short-circuit hoods waste energy and degrade kitchen environment and hygiene. If we assume a generic baseline C&C rate for a cooking process, studies show the exhaust rates for short-circuit hoods generally exceed those for exhaust-only hoods by at least the amount of air short-circuited, thus decreasing performance and increasing energy consumption.

Engineers are often in the habit of simply providing makeup air units in kitchens to provide makeup air equal to the exhaust flow rate even when "free" transfer air is available from adjacent spaces. Adding makeup air when transfer air is available is a wasteful design practice and should be prohibited. Using available transfer air saves energy and reduces the first cost of the makeup unit and exhaust system in the adjacent spaces. It simply requires some engineering and coordination to provide a path for the transfer air.

The proposed change is also intended to get rid of a wasteful common practice: specifying excessive exhaust airflow by selecting hoods that are not listed or have not been subjected to a recognized performance test. The exhaust airflow flow rates in Table C403.2.7 are 30% below the minimum airflow rates in ASHRAE Standard 154-2003.

ASHRAE Research Project 1202 shows that hoods listed per UL Standard 710 and/or are engineered and tested per ASTM/ANSI 1704 have exhaust rates that are at least 30% less than the exhaust airflow requirements for unlisted or untested hoods. The intent is to conserve energy through the use of engineered hoods or performance based hoods that have been validated based on consensus standard test methods it should be noted that ASHRAE research has not demonstrated that exhaust rate reductions substantially beyond the 30% can or should be recommended at this time. This requirement should not increase first cost and in many cases will reduce first cost through downsizing of exhaust, supply and cooling equipment.

The 5,000 CFM threshold recognizes small restaurants. In addition makeup air can be fully conditioned. As a result there are now cost effective opportunities to reduce energy with demand ventilation systems or energy recovery devices.

This comment adds a requirement that hoods must be listed (which is required by the IMC to utilize exhaust rates lower than the IMC has for unlisted hood values).

Equipment manufacturers reviewed and agreed to the values proposed in the new table.

To address the Code Development Committee's concerns, this proposal has been modified to be such that hoods must be listed (which is required by the IMC to utilize exhaust rates lower than the IMC has for unlisted hood values).

Staff Note: The UL 710 standard is already a referenced standard in the *International Mechanical Code.*

CE220-13

Final Action: AS AM AMPC____ D

CE223-13
C403.2.7.1.1

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

> **Exception:** ~~Continuously welded and l~~Locking-type longitudinal joints and seams need not be sealed as specified in this section ~~on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification~~.

Reason: This proposal clarifies that locked joint construction methods for duct systems meet the code for longitudinal seams. The requirement clearly allows welded longitudinal seems to be acceptable, so that is not needed in the exception. As currently stated in the exception, it might be interpreted that the longitudinal seam must be both welded and locking. That is clearly not the intent, as welding and locking together are not typical duct sealing approaches.

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

C403.2.7.1.1-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal, similar to CE222-13, clarifies the exception.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

> **Exception:** Locking-type longitudinal joints and seams of other than the snap-lock and button-lock types need not be sealed as specified in this section.

Commenter's Reason: At the code development hearing, there was no opposition to CE223-13 and it was approved as submitted. Related changes to CE223-13 are CE222-13 and CE224-13. CE224-13 was recommended for disapproval based on testimony by the proponent that action on prior code change proposals (CE222 and CE223) eliminated the need for CE224-13. CE222-13 was recommended for approval and per that code change proposal the exception would read as follows:

> *"For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types."*

DOE is submitting this public comment in an attempt to reconcile CE222-13 and CE223-13, both of which were approved as submitted. As currently written, CE222 would essentially 'wipe out' CE223-13. CE222-13 has errors that the language proposed in this public comment addresses.

- There is no need to indicate in the exception a threshold of 2 inches static pressure, because that threshold is covered in the parent section to which the exception applies. This is a flaw with the current code that CE223-13 addresses, but is not addressed in CE222-13.
- The parent section shows sealing with welds to be an acceptable method of closure, and as such there is then no need to exempt welded joints and seams from that requirement. This is a flaw with the current code that CE223-13 addresses but is not addressed in CE222-13.
- In addressing the above two issues with the current code text CE223-13 results in simplifying the code with respect to what ends up being exempted–locking type longitudinal joints and seams. CE222-13, after addressing the above two issues that CE222-13 carries over from the current code, essentially exempts locking type joints and seams of other than snap-lock and button-lock types.
- The public comment modifies CE223-13 to embody the simplicity and clarification of the current code intended in CE223-13 along with the new technical focus that exempts all locking type longitudinal joints and seams EXCEPT those of the snap lock and button lock types.

The code change proposal as modified by this public comment will ensure the desired consistency with the IMC and applicability of the code to certain joints and seams, as embodied in CE222-13. In addition, the code change proposal as modified by this public comment will capture the simplicity and clarity embodied in CE223-13. Both CE222-13 and CE223-13 were recommended for approval as submitted but, as noted above, it would be challenging to reconcile if both were approved as submitted at the final action hearing. This public comment allows the voting members of ICC to review and vote on how these two approved changes would be reconciled and appear in the 2015 IECC.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE223-13

Final Action: AS AM AMPC____ D

CE227-13
C403.2.8 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.8 Laboratory exhaust systems. Buildings with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm shall be provided with at least one of the following:

1. A VAV laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates to the minimum required in the *International Mechanical Code*
2. A VAV laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates by at least 50 percent of design condition.
3. A heat recovery system to precondition makeup air from laboratory exhaust with at least a 50 percent sensible recovery effectiveness.

~~3.~~4. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust air flow rate that is not heated above room setpoint or cooled below room setpoint and does not utilize non-adiabatic humidification.

Reason: For consistency with Standard 90.1-2010. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IES Standard 90.1-2010.

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

C403.2.8 (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds a cost effective area to obtain additional energy savings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Code development is a process. A key part of that process is having a rationale for the content of the code and a good reason for making changes. The process should give all parties a chance to read, hear and weigh the arguments. We cannot allow "because I think it's a good idea" or "I said so" to become the metric by which proposals are approved.

The appropriate rationale for a particular proposal will vary. Sometimes only a short rationale is required; other times the issues are more difficult and suggest a broader rationale. Often a summary of an analysis, with a pointer to more fleshed out information works well.

ASHRAE is legitimately an active player in the I-code development process, submitting approximately 40 proposed changes this cycle alone. An effective code development process requires interaction between viewpoints. There is no requirement that the I-Codes reflect every single thing proposed or included in the ASHRAE standards. In fact, ASHRAE 90.1 is considered an alternate path of compliance recognized in the IECC and it becomes counterproductive to make sure the two match as it takes away that additional option for energy compliance.

Granting the fact that ASHRAE meetings are public, evaluating submissions should not require attending the numerous and lengthy meetings, subcommittee meetings and phone calls. Given an extended history of ASHRAE changes often lacking reasons beyond "consistency with ASHRAE", the policy of needing a rationale for inclusion in the code should be enforced. For that reason, disapproval of 12 proposals is requested. This is not meant to suggest ASHRAE proposals necessarily lack merit, but rather that without a reason other than "it's because it is in the ASHRAE standard", it is impossible to judge that merit.

The following proposals are included, but only the first two will have this larger reason statement. The subsequent nine proposals will have brief reasons statements. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333.

According to ICC's CP# 28-05 on "Code Development"

> ***3.3.5.2 Reasons:*** *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
> ***3.3.5.3 Substantiation:*** *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE227-13

Final Action: AS AM AMPC____ D

CE230-13, Part I
C403.2.8.2 (New), R403.3.2 (New) (IRC N1103.2 (New))

Proposed Change as Submitted

Proponent: Howard Ahern, Airex Mfg., representing self (howard.ahern@airexmfg.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C403.2.8.2 Chilled water and refrigerant suction piping. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include a Class I or Class II vapor retarding facing located outside the insulation. Piping insulation protection shall be removable and reusable. Piping insulation shall be in accordance with Section C403.2.8.1.

Reason: The use of Vapor Retarders with suction line pipe insulation has been a requirement of the ASHRAE 90.1 Standard going back to 2004. This code change is needed need to specify requirements for Chilled water and refrigerant suction piping. This change will ensures steady, long-term thermal performance, and prevent the transference of moisture**.** Preventing moisture exchange will help prevent Wet insulation and maintain system integrity, sustainability, and energy savings of the insulation. Preventing moisture transference will also help prevent the growth of mold.

All AC units require periodic maintenance. The frequency varies with how hard the unit operates, exterior temperature, preventive maintenance program, and many others. In every occasion, maintenance provides an excuse for the suction line insulation to be touched and or removed. Pipe insulation removal from suction lines often results in damage to the insulation itself requiring replacement.

Protection for the suction piping insulation therefore need to be removable and reusable. This will help insure system integrity and sustainability of the pipe insulation, reducing replacement.

Cost Impact: This code change will increase cost; For the vapor retarders only and not will not increase cost in those jurisdictions that use ASHRAE Standard 90.1 as vapor retarders has been part of ASHRAE Standard 90.1 since 2004.

C403.2.8.2-EC-AHERN.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Modified**

Modify the proposal as follows:

C403.2.8.2 Chilled water and refrigerant suction piping. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include a Class I or Class II vapor retarding facing located outside of the insulation, or the insulation shall be installed at a thickness which qualifies as a Class I or Class II vapor retarder. ~~Piping insulation protection shall be removable and reusable. Piping insulation shall be in accordance with Section C403.2.8.1.~~

Committee Reason: The modification eliminates the requirement for the insulation to be removable and reusable. Installations of insulation should not be limited to that criteria. The proposal provides better design for this piping when located outside of conditioned space.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Young, Technical Director, representing ITW Insulation Systems, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C403.2.8.2 Chilled water and refrigerant suction piping. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include a ~~Class I or Class II~~ vapor retarding facing <u>with a permeance of less than or equal to 0.02 perms measured in accordance with Procedure A of ASTM E96</u> located outside of the insulation, or the insulation shall be installed at a thickness <u>that achieves a permeance of less than or equal to 0.02 perms.</u> ~~qualifies as a Class I or Class II vapor retarder.~~

Commenter's Reason: This proposal introduces the concept of vapor retarder class as defined in the IBC and proposes applying it to the vapor retarders (VRs) used on pipe insulation. This is a mistake since the VR properties required in the IBC are not appropriate to pipe insulation. The Vapor retarder classes as defined in the IBC apply to applications located on building envelopes (walls and roofs) where there can be vapor flow in either direction depending on the season or even the time of day. The permeance in these applications is appropriately required to be "Class I: 0.1 perm or less" or "Class II: 0.1 < perm ≤ 1.0 perm".

Insulation systems on cold pipe have a unidirectional flow of moisture from the ambient surroundings toward the cold pipe. As a result, the classes of vapor retarder listed in the IBC and used in this proposal for pipe insulation applications do not require a low enough permeance. The typical permeance of vapor retarders on insulation for use on pipe should be ≤0.02 perms as measured using Procedure A (desiccant method at 73.4°F) of ASTM E96.

References to a permeance requirement for cold pipe of ≤0.02 perms are contained in the following locations:

- 2010 ASHRAE Handbook of Refrigeration, Chapter 10, "Insulation Systems for Refrigerant Piping"
  - Page 10.7, Section on Vapor Retarders which says, "Insulation materials should be protected by a continuous vapor retarder with a maximum permeance of 0.02 perm, either integral to the insulation or a vapor retarder material applied to the exterior surface of the insulation."
- 2013 ASHRAE Handbook of Fundamentals, Chapter 23, "Insulation for Mechanical Systems"
  - Page 23.9, section on Water vapor Permeability which says, "In below-ambient applications, it is important to minimize the rate of water vapor flow to the cold surface. This is normally accomplished by using vapor retarders or insulation materials (e.g. cellular glass insulation) with a permeance less than or equal to 0.02 perm, or both."
  - Page 23.14, section on Insulation Finish for Below-Ambient Temperatures which says, "Sheet-type vapor retarders used on below ambient pipe insulation should have a maximum permeance of 0.02 perm, when tested per ASTM Standard E96, procedure A (desiccant method) or B (water method). Insulation materials that meet the permeance requirements of an application can be installed without separate vapor retarders, relying on the low permeability and thickness of the insulation material to resist vapor flow, but must be carefully sealed or cemented at all joints to avoid gaps in the insulation."

Based on the above information, this proposed change to the IECC must be modified such that the permeance requirement for pipe insulation is in agreement with the standard industry recommendation of ≤0.02 perms.

CE230-13, Part I

Final Action: AS AM AMPC____ D

CE230-13, Part II
C403.2.8.2 (New), R403.3.2 (New) (IRC N1103.2 (New))

Proposed Change as Submitted

Proponent: Howard Ahern, Airex Mfg., representing self (howard.ahern@airexmfg.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.3.2 (N1103.3.2) Refrigerant suction piping. Insulation covering refrigerant suction piping located outside the conditioned space shall include a Class I or Class II vapor-retardant facing located on the outside of the insulation. Piping insulation protection shall be removable and reusable. Piping insulation shall be in accordance with Section R403.3.

Reason: The use of Vapor Retarders with suction line pipe insulation has been a requirement of the ASHRAE 90.1 Standard going back to 2004. This code change is needed need to specify requirements for Chilled water and refrigerant suction piping. This change will ensures steady, long-term thermal performance, and prevent the transference of moisture**.** Preventing moisture exchange will help prevent Wet insulation and maintain system integrity, sustainability, and energy savings of the insulation. Preventing moisture transference will also help prevent the growth of mold.

All AC units require periodic maintenance. The frequency varies with how hard the unit operates, exterior temperature, preventive maintenance program, and many others. In every occasion, maintenance provides an excuse for the suction line insulation to be touched and or removed. Pipe insulation removal from suction lines often results in damage to the insulation itself requiring replacement.

Protection for the suction piping insulation therefore need to be removable and reusable. This will help insure system integrity and sustainability of the pipe insulation, reducing replacement.

Cost Impact: This code change will increase cost; For the vapor retarders only and not will not increase cost in those jurisdictions that use ASHRAE Standard 90.1 as vapor retarders has been part of ASHRAE Standard 90.1 since 2004.

C403.2.8.2-EC-AHERN.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Modified**

Modify the proposal as follows:

R403.3.2 (N1103.3.2) Refrigerant suction piping. Insulation covering refrigerant suction piping located outside the conditioned space shall include a Class I or Class II vapor-retardant facing located on the outside of the insulation or the insulation shall be installed at a thickness that qualifies as a Class I or Class II vapor retarder. ~~Piping insulation protection shall be removable and reusable. Piping insulation shall be in accordance with Section R403.3.~~

Committee Reason: This proposal would add an important feature dealing with HVAC systems that might otherwise be overlooked.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Young, Technical Director, representing ITW Insulation Systems, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.3.2 (**N1103.3.2) Refrigerant suction piping.** Insulation covering refrigerant suction piping located outside the conditioned space shall include a ~~Class I or Class II~~ vapor-retardant facing <u>with a permeance of less than or equal to 0.02 perms measured in accordance with Procedure A of ASTM E96</u> located on the outside of the insulation or the insulation shall be installed at a thickness that <u>achieves a permeance of less than or equal to 0.02 perms.</u> ~~qualifies as a Class I or Class II vapor retarder.~~

Commenter's Reason: This proposal introduces the concept of vapor retarder class as defined in the IBC and proposes applying it to the vapor retarders (VRs) used on pipe insulation. This is a mistake since the VR properties required in the IBC are not appropriate to pipe insulation. The Vapor retarder classes as defined in the IBC apply to applications located on building envelopes (walls and roofs) where there can be vapor flow in either direction depending on the season or even the time of day. The permeance in these applications is appropriately required to be "Class I: 0.1 perm or less" or "Class II: 0.1 < perm ≤ 1.0 perm".

Insulation systems on cold pipe have a unidirectional flow of moisture from the ambient surroundings toward the cold pipe. As a result, the classes of vapor retarder listed in the IBC and used in this proposal for pipe insulation applications do not require a low enough permeance. The typical permeance of vapor retarders on insulation for use on pipe should be ≤0.02 perms as measured using Procedure A (desiccant method at 73.4°F) of ASTM E96.

References to a permeance requirement for cold pipe of ≤0.02 perms are contained in the following locations:

- 2010 ASHRAE Handbook of Refrigeration, Chapter 10, "Insulation Systems for Refrigerant Piping"
  - Page 10.7, Section on Vapor Retarders which says, "Insulation materials should be protected by a continuous vapor retarder with a maximum permeance of 0.02 perm, either integral to the insulation or a vapor retarder material applied to the exterior surface of the insulation."
- 2013 ASHRAE Handbook of Fundamentals, Chapter 23, "Insulation for Mechanical Systems"
  - Page 23.9, section on Water vapor Permeability which says, "In below-ambient applications, it is important to minimize the rate of water vapor flow to the cold surface. This is normally accomplished by using vapor retarders or insulation materials (e.g. cellular glass insulation) with a permeance less than or equal to 0.02 perm, or both."
  - Page 23.14, section on Insulation Finish for Below-Ambient Temperatures which says, "Sheet-type vapor retarders used on below ambient pipe insulation should have a maximum permeance of 0.02 perm, when tested per ASTM Standard E96, procedure A (desiccant method) or B (water method). Insulation materials that meet the permeance requirements of an application can be installed without separate vapor retarders, relying on the low permeability and thickness of the insulation material to resist vapor flow, but must be carefully sealed or cemented at all joints to avoid gaps in the insulation."

Based on the above information, this proposed change to the IECC must be modified such that the permeance requirement for pipe insulation is in agreement with the standard industry recommendation of ≤0.02 perms.

CE230-13, Part II

Final Action: AS AM AMPC____ D

CE232-13
C403.2.10, C403.2.10.3 (NEW)

Proposed Change as Submitted

Proponent: Michael Ivanovich, AMCA International (mivanovich@amca.org)

Revise as follows:

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through ~~C403.2.10.2~~ C403.2.10.3.

C403.2.10.3 Fan efficiency verification. The efficiency of fans shall be verified through certification under an *approved* certification program or, where no certification program exists, the fan efficiency ratings shall be supported by data furnished by the manufacturer.

Reason: The energy usage of fans is under increasing scrutiny by designers, building owners, commissioning agents, code enforcement professionals, federal agencies, and other code users. This code change proposal requires fan manufacturers to provide relevant information related to the energy efficient performance of their products. The proposed language has been extracted from the IECC section on HVAC equipment in Section C403.2.3 as an equipment performance requirement. It is applicable to fan products.

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

C403.2.10-EC-IVANOVICH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved in light of the approval of CE234-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Amanda Hickman, Intercode, Inc, representing AMCA International, requests Approval as Submitted.

Commenter's Reason: Fan energy usage is under increasing scrutiny by designers, building owners, the DOE, and others. For this reason it would benefit code enforcement professionals, as well as building designers, if they had information on a fan's efficiency performance readily available. This language will provide the mechanism for doing just that by requiring fan manufacturers to provide relevant information to that effect and where established, verify the efficiency of their products through and *approved* certification program.

The proposed language has been extracted from the IECC section on HVAC equipment in Section C403.2.3 as an equipment performance requirement.

CE232-13
Final Action: AS AM AMPC____ D

CE239-13

C403.2.12 (NEW), Table C403.2.12(1) (NEW), Table C403.2.12 (2) (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.12 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C403.2.12(1) and C403.2.12(2) when tested and rated in accordance with AHRI Standard 1200. The energy use shall be verified through certification under an approved certification program or, where no certification program exists, the energy use shall be supported by data furnished by the equipment manufacturer.

TABLE C403.2.12(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION

Equipment Type	Application	Energy Use Limits (kWh per day) [a]	Test Procedure
Refrigerator with solid doors	Holding Temperature	0.10 x V + 2.04	AHRI 1200
Refrigerator with transparent doors		0.12 x V + 3.34	
Freezers with solid doors		0.40 x V + 1.38	
Freezers with transparent doors		0.75 x V + 4.10	
Refrigerators/freezers with solid doors		the greater of 0.12 x V + 3.34 or 0.70	
Commercial refrigerators	Pulldown	0.126 x V + 3.51	

[a] V = volume of the chiller or frozen compartment as defined in AHAM-HRF-1

TABLE C403.2.12(2)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATORS AND FREEZERS

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012 [a,b]	Test Procedure
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
VOP.RC.M	Vertical Open	Remote Condensing	Medium Temperature	0.82 × TDA + 4.07	AHRI 1200
SVO.RC.M	Semivertical Open	Remote Condensing	Medium Temperature	0.83 × TDA + 3.18	
HZO.RC.M	Horizontal Open	Remote Condensing	Medium Temperature	0.35 × TDA + 2.88	
VOP.RC.L	Vertical Open	Remote Condensing	Low Temperature	2.27 × TDA + 6.85	
HZO.RC.L	Horizontal Open	Remote Condensing	Low Temperature	0.57 × TDA + 6.88	

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012 [a,b]	Test Procedure
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
VCT.RC.M	Vertical Transparent Door	Remote Condensing	Medium Temperature	0.22 TDA + 1.95	
VCT.RC.L	Vertical Transparent Door	Remote Condensing	Low Temperature	0.56 × TDA + 2.61	
SOC.RC.M	Service Over Counter	Remote Condensing	Medium Temperature	0.51 × TDA + 0.11	
VOP.SC.M	Vertical Open	Self Contained	Medium Temperature	1.74 × TDA + 4.71	
SVO.SC.M	Semivertical Open	Self Contained	Medium Temperature	1.73 × TDA + 4.59	
HZO.SC.M	Horizontal Open	Self Contained	Medium Temperature	0.77 × TDA + 5.55	
HZO.SC.L	Horizontal Open	Self Contained	Low Temperature	1.92 × TDA + 7.08	
VCT.SC.I	Vertical Transparent Door	Self Contained	Ice Cream	0.67 × TDA + 3.29	
VCS.SC.I	Vertical Solid Door	Self Contained	Ice Cream	0.38 × V + 0.88	
HCT.SC.I	Horizontal Transparent Door	Self Contained	Ice Cream	0.56 × TDA + 0.43	
SVO.RC.L	Semivertical Open	Remote Condensing	Low Temperature	2.27 × TDA + 6.85	
VOP.RC.I	Vertical Open	Remote Condensing	Ice Cream	2.89 × TDA + 8.7	
SVO.RC.I	Semivertical Open	Remote Condensing	Ice Cream	2.89 × TDA + 8.7	
HZO.RC.I	Horizontal Open	Remote Condensing	Ice Cream	0.72 × TDA + 8.74	
VCT.RC.I	Vertical Transparent Door	Remote Condensing	Ice Cream	0.66 × TDA + 3.05	
HCT.RC.M	Horizontal Transparent Door	Remote Condensing	Medium Temperature	0.16 × TDA + 0.13	
HCT.RC.L	Horizontal Transparent Door	Remote Condensing	Low Temperature	0.34 × TDA + 0.26	
HCT.RC.I	Horizontal Transparent Door	Remote Condensing	Ice Cream	0.4 × TDA + 0.31	
VCS.RC.M	Vertical Solid Door	Remote Condensing	Medium Temperature	0.11 × V + 0.26	
VCS.RC.L	Vertical Solid Door	Remote Condensing	Low Temperature	0.23 × V + 0.54	
VCS.RC.I	Vertical Solid Door	Remote Condensing	Ice Cream	0.27 × V + 0.63	
HCS.RC.M	Horizontal Solid	Remote Condensing	Medium	0.11 × V + 0.26	

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012 [a,b]	Test Procedure
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
	Door		Temperature		
HCS.RC.L	Horizontal Solid Door	Remote Condensing	Low Temperature	0.23 × V + 0.54	
HCS.RC.I	Horizontal Solid Door	Remote Condensing	Ice Cream	0.27 × V + 0.63	
HCS.RC.I	Horizontal Solid Door	Remote Condensing	Ice Cream	0.27 × V + 0.63	
SOC.RC.L	Service Over Counter	Remote Condensing	Low Temperature	1.08 × TDA + 0.22	
SOC.RC.I	Service Over Counter	Remote Condensing	Ice Cream	1.26 × TDA + 0.26	
VOP.SC.L	Vertical Open	Self Contained	Low Temperature	4.37 × TDA + 11.82	
VOP.SC.I	Vertical Open	Self Contained	Ice Cream	5.55 × TDA + 15.02	
SVO.SC.L	Semivertical Open	Self Contained	Low Temperature	4.34 × TDA + 11.51	
SVO.SC.I	Semivertical Open	Self Contained	Ice Cream	5.52 × TDA + 14.63	
HZO.SC.I	Horizontal Open	Self Contained	Ice Cream	2.44 × TDA + 9.0	
SOC.SC.I	Service Over Counter	Self Contained	Ice Cream	1.76 × TDA + 0.36	
HCS.SC.I	Horizontal Solid Door	Self Contained	Ice Cream	0.38 × V + 0.88	

[a] V = Volume of the case, as measured in accordance with Appendix C of AHRI 1200.
[b] TDA = Total display area of the case, as measured in accordance with Appendix D of AHRI 1200.
[c] Equipment class designations consist of a combination (in sequential order separated by periods(AAA).(BB).(C)) of:
(AAA) An equipment family code where:
VOP=vertical open
SVO=semivertical open
HZO=horizontal open,
VCT=vertical transparent doors
VCS=vertical solid doors
HCT=horizontal transparent doors
HCS=horizontal solid doors
SOC=service over counter
(BB) An operating mode code, either
RC=remote condensing, or
SC=self-contained).
(C) A rating temperature code, either:
M=medium temperature (38 °F)
L=low temperature (0 °F), or
I=ice-cream temperature (15 °F).
For example, ''VOP.RC.M'' refers to the ''vertical open, remote condensing, medium temperature'' equipment class.

Add new standards to Chapter 5 as follows:

AHRI

1200-10 Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets.

AHAM

HRF-1 2007 Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address energy efficiency opportunities available from commercial refrigeration and freezing equipment. In buildings where such equipment is located it contributes to the energy use of the building and now that there is a test procedure for efficiency of this equipment and minimum efficiencies are in standard 90.1-2010 it seems reasonable to include them in the IECC, noting this type of equipment is addressed in the IMC as to health and life safety. The change ensures continued consistency between the IECC and standard 90.1-2010.

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

Analysis: A review of the standard proposed for inclusion in the code, AHRI 1200-2010 Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

A review of the standard proposed for inclusion in the code, AHAM-HRF-1-2007 Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C403.2.12 (NEW) #1-EC-FERGUSON.doc

Committee Action Hearing Results

For staff analysis of the content of AHRI 1200-10 and AHAM HRF-1 2007 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The proposal incorporates new federal standards applicable to freezers and commercial refrigeration installations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Code development is a process. A key part of that process is having a rationale for the content of the code and a good reason for making changes. The process should give all parties a chance to read, hear and weigh the arguments. We cannot allow "because I think it's a good idea" or "I said so" to become the metric by which proposals are approved.

The appropriate rationale for a particular proposal will vary. Sometimes only a short rationale is required; other times the issues are more difficult and suggest a broader rationale. Often a summary of an analysis, with a pointer to more fleshed out information works well.

ASHRAE is legitimately an active player in the I-code development process, submitting approximately 40 proposed changes this cycle alone. An effective code development process requires interaction between viewpoints. There is no requirement that the I-Codes reflect every single thing proposed or included in the ASHRAE standards. In fact, ASHRAE 90.1 is considered an alternate path of compliance recognized in the IECC and it becomes counterproductive to make sure the two match as it takes away that additional option for energy compliance.

Granting the fact that ASHRAE meetings are public, evaluating submissions should not require attending the numerous and lengthy meetings, subcommittee meetings and phone calls. Given an extended history of ASHRAE changes often lacking reasons beyond "consistency with ASHRAE", the policy of needing a rationale for inclusion in the code should be enforced. For that reason, disapproval of 12 proposals is requested. This is not meant to suggest ASHRAE proposals necessarily lack merit, but rather that without a reason other than "it's because it is in the ASHRAE standard", it is impossible to judge that merit.

The following proposals are included, but only the first two will have this larger reason statement. The subsequent nine proposals will have brief reasons statements. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333.

According to ICC's CP# 28-05 on "Code Development"

> ***3.3.5.2 Reasons:*** *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current*

Code provisions and explains how such proposals will improve the Code.
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE239-13

Final Action: AS AM AMPC____ D

CE240-13

C202 (NEW), C403.2.12 (NEW), C403.2.13 (NEW), C403.5 (NEW), C403.5.1 (NEW), C403.5.2 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.12 Walk-in Coolers and Walk-in Freezers. Site assembled or site constructed *walk-in coolers* and *walk-in freezers* shall comply with the following:

1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch of full closure.

   Exception: Closers are not required for doors over 3 feet 9 inches wide or 7 feet tall.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors, or other method of minimizing infiltration when the doors are open.

3. Walls shall be provided with insulation having a thermal resistance of not less than R–25, ceilings shall be provided with insulation having a thermal resistance of not less than R–25 and doors of *walk-in coolers* and *walk –in freezers* shall be provided with insulation having a thermal resistance of not less than R–32.

   Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R–28.

5. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall be electronically commutated motors or 3-phase motors.

6. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses or shall be provided with a device that automatically turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* was last occupied.

7. Transparent reach-in doors for and windows in opaque walk-*in freezer* doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.

8. Transparent reach-in doors for and windows in opaque *walk-in cooler* doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled;

9. Anti-sweat heaters that are not provided with anti-sweat heater controls shall have a total door rail, glass, and frame heater power draw not greater than 7.1 Watts per square foot of door opening for *walk-in freezers*, and not greater than 3.0 Watts per square foot of door opening for *walk-in coolers*.

10. Anti-sweat heater controls shall be capable of reducing the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

11. Condenser fan motors that are less than 1 horsepower in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.

    Exception: Fan motors in *walk-in coolers* and *walk-in freezers* combined in a single enclosure greater than 3,000 square feet in floor area are exempt.

C403.2.13 Refrigerated display cases. Site assembled or site constructed refrigerated display cases shall comply with the following:

1. Lighting in refrigerated display cases and glass doors installed on walk-in coolers and freezers shall be controlled by one of the following;

   1.1 Automatic time switch controls to turn off lights during non-business hours. Timed overrides for display cases or walk-in coolers and freezers may be used to turn the lights on for up to one hour and shall automatically time out to turn the lights off.

   1.2 Motion sensor controls on each display case or walk-in door section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated. how about is 'unoccupied' as you have used in other proposals.

2. All low temperature display cases shall incorporate temperature based defrost termination control with a time limit default. The defrost cycle shall terminate first on an upper temperature limit breach and second upon a time limit breach.

3. Anti-sweat heater controls shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C403.5 Refrigeration systems Refrigerated display cases, *walk-in coolers* or *walk-in freezers* that are served by remote compressors and remote condensers not located in a *condensing unit*, shall meet the requirements of Section C403.5.and C403.5.2.

Exception: Systems where the working fluid in the refrigeration cycle goes through both subcritical and supercritical states (transcritical) or systems that use ammonia refrigerant are exempt.

C403.5.1 Condensers serving refrigeration systems. Fan-powered condensers shall comply with the following:

1. The design *saturated condensing temperatures* for air-cooled condensers shall not exceed the design dry bulb temperature plus 10°F for *low temperature refrigeration* systems, and the design dry bulb temperature plus 15°F for *medium temperature refrigeration* systems where the s*aturated condensing temperature* for blend refrigerants shall be determined using the average of liquid and vapor temperatures as converted from the condenser drain pressure

2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.

3. All condenser fans for air-cooled condensers, evaporatively cooled condensers, air or water cooled fluid coolers or cooling towers shall reduce fan motor demand to no more than 30% of design wattage at 50% of design air volume, and incorporate one of the following continuous variable speed fan control approaches:

3.1 Refrigeration system condenser control for air-cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient drybulb temperature.

3.2 Refrigeration system condenser control for evaporatively cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient wetbulb temperature.

4. Multiple fan condensers shall be controlled in unison.

5. The minimum condensing temperature setpoint shall be no greater than 70˚F.

C403.5.2 Compressor systems. Refrigeration compressor systems shall comply with the following:

1. Compressors and multiple-compressor systems suction groups shall include control systems that use floating suction pressure control logic to reset the target suction pressure temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

   Exception. Controls are not required for the following:

   1. Single compressor systems that do not have variable capacity capability.

   2. Suction groups that have a design saturated suction temperature of 30˚F or higher, suction groups that comprise the high stage of a two-stage or cascade system or suction groups that primarily serve chillers for secondary cooling fluids.

2. Liquid sub-cooling shall be provided for all low temperature compressor systems with a design cooling capacity equal to or greater than 100,000 Btu/hr with a design saturated suction temperature of -10˚F or lower. The sub-cooled liquid temperature shall be controlled at a maximum temperature setpoint t of 50˚F at the exit of the sub-cooler using either compressor economizer (inter-stage) ports or a separate compressor suction group operating at a saturated suction temperature of 18˚F or higher.

   2.1 Insulation for liquid lines with a fluid operating temperature less than 60˚F are shall comply with Table C403.2.8.

3. All compressors that incorporate internal or external crankcase heaters shall provide a means to cycle the heaters off during compressor operation.

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

BUBBLE POINT. The refrigerant liquid saturation temperature at a specified pressure

CONDENSING UNIT. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively – cooled, and/or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

REFRIGERANT DEW POINT. The refrigerant vapor saturation temperature at a specified pressure.

REFRIGERATION SYSTEM, LOW TEMPERATURE. Systems for maintaining food product in a frozen state in refrigeration applications.

REFRIGERATION SYSTEM, MEDIUM TEMPERATURE. Systems for maintaining food product above freezing in refrigeration applications.

SATURATED CONDENSING TEMPERATURE. The saturation temperature corresponding to the measured refrigerant pressure at the condenser inlet for single component and azeotropic refrigerants, and the arithmetic average of the dew point and *bubble point* temperatures corresponding to the refrigerant pressure at the condenser entrance for zeotropic refrigerants.

WALK-IN COOLER. An enclosed storage space less than 3,000 square feet in floor area, designed to maintain the space warmer than 32°F but cooler than 55°F that has a ceiling height of not less than 7 feet

WALK-IN FREEZER. An enclosed storage space less than 3,000 square feet in floor area, designed to maintain the space at no greater than 32°F that has a ceiling height of not less than 7 feet

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address the energy efficiency associated with refrigeration systems and coolers. These systems and equipment are prevalent in many building types and should be addressed in the IECC because they represent an opportunity to save additional energy. The change ensures continued consistency between the IECC and standard 90.1.

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

C403.2.12 (NEW) #2-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides construction and efficiency standards for walk-in coolers and freezers as well as similar refrigeration equipment and systems consistent with new federal standards.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE240-13
Final Action: AS AM AMPC____ D

CE241-13

C403.1, C403.3, C403.3.1.1 (New), C403.1.1.1, C403.3.3.1.1.2, C403.3.1.2 (New), C403.3.1.1.3, Table C403.3.1.1(1), Table C403.3.1.1.3(2), C403.3.1.1.4, C403.3.1.4 (New), C403.3.1.4.1 (New), C403.3.1.4.2 (New), C403.3.2, C403.4 through C403.4.3.5

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and ~~either:~~ shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided.

~~1. Section C403.3 (Simple systems); or~~
~~2. Section C403.4 (Complex systems).~~

C403.3 ~~Simple HVAC systems and equipment~~ Economizers (Prescriptive). This section applies to buildings served by ~~unitary or packaged~~ HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8). ~~, each serving one *zone* and controlled by a single thermostat in the *zone* served. It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed~~

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

C403.3.1.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

C403.3.1.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

Exception: Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

**TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS**

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 33,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

**TABLE C403.3.1(2)
EQUIPMENT EFFICIENCY
PERFORMANCE EXCEPTION FOR ECONOMIZERS**

CLIMATE ZONES	COOLING EQUIPMENT PERFORMANCE IMPROVEMENT (EER OR IPLV)
2B	10% Efficiency Improvement
3B	15% Efficiency Improvement
4B	20% Efficiency Improvement

~~C403.3.1.1~~ C403.3.1.3 Air economizers. Air economizers shall comply with Sections ~~C403.3.1.1.1 through C403.3.1.1.4~~. C403.3.1.3.1 through C403.3.1.3.4.

~~C403.3.1.1.1~~ C403.3.1.3.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

~~C403.3.1.1.2~~ C403.3.1.3.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.

Exception: The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

~~C403.3.1.1.3.~~ C403.3.1.3.3 High-limit shutoff. Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table ~~C403.3.1.1.3(1)~~ C403.3.1.3.3(1). High-limit shutoff control settings for these control types shall be those specified in Table ~~C403.3.1.1(2)~~ C403.3.1.3.3(2).

TABLE ~~C403.3.1.1(1)~~ C403.3.1.3.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	—

a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

TABLE ~~C403.3.1.1.3(2)~~C403.3.1.3.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	$T_{OA} > 75°F$	Outdoor air temperature exceeds 75°F
	5A, 6A, 7A	$T_{OA} > 70°F$	Outdoor air temperature exceeds 70°F
	All other zones	$T_{OA} > 65°F$	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	All	$h_{OA} > 28$ Btu/lb[a]	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outdoor air temperature/RH exceeds the “A” setpoint curve[b]
Differential enthalpy	All	$h_{OA} > h_{RA}$	Outdoor air enthalpy exceedsreturn air enthalpy
Dew-point and dry bulb temperatures	All	$DP_{OA} > 55°F$ or $T_{OA} > 75°F$	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × 5/9 , 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. Setpoint “A” corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

~~C403.3.1.1.4~~ <u>C403.3.1.3.4</u> Relief of excess outdoor air. Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

<u>**C403.3.1.4 Water-side economizers.** Water-side economizers shall comply with Sections C403.3.1.4.1 through C403.3.1.4.2</u>

<u>**C403.3.1.4.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.</u>

> <u>**Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).</u>

<u>**C403.3.1.4.2 Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.</u>

~~**C403.3.2 Hydronic system controls.** Hydronic systems of at least 300,000 Btu/h (87 930 W) design output capacity supplying heated and chilled water to comfort conditioning systems shall include controls that meet the requirements of Section C403.4.3.~~

C403.4 ~~Complex~~ <u>Hydronic and multi-zone</u> HVAC system <u>controls</u> and equipment. (Prescriptive). This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3. <u>Hydronic and multi-zone HVAC system controls and equipment shall comply with this section.</u>

~~**C403.4.1 Economizers.** Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.~~

~~**C403.4.1.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.~~

> ~~**Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).~~

~~**C403.4.1.2 Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.~~

~~**C403.4.1.3 Integrated economizer control.** Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.~~

> ~~**Exceptions:**~~
>
> 1. ~~Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.~~

2. ~~Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

~~**C403.4.1.4 Economizer heating system impact.** HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.~~

> ~~**Exception:** Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.~~

~~C403.4.2~~ <u>C403.4.1</u> Variable air volume (VAV) fan control. Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:

1. Driven by a mechanical or electrical variable speed drive;
2. Driven by a vane-axial fan with variable-pitch blades; or
3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

~~C403.4.2.1~~ <u>C403.4.1.1</u> Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

~~C403.4.2.2~~ <u>C403.4.1.2</u> Set points for direct digital control. For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open.

~~C403.4.3~~ <u>C403.4.2</u> Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections ~~C403.4.3.1 through C403.4.3.3~~ <u>C403.4.2.1 through C403.4.2.3</u>. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146 550 W) input design capacity shall include either a multistaged or modulating burner.

~~C403.4.3.1~~ <u>C403.4.2.1</u> Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

~~C403.4.3.2~~ <u>C403.4.2.2</u> Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a dead band between changeover from one mode to the other of at least 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be no more than 30°F (16.7°C) apart.

~~C403.4.3.3~~ <u>C403.4.2.3</u> Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections ~~C403.4.3.1~~ <u>C403.4.2.3.1,</u> through ~~C403.4.3.3.3~~ <u>C403.4.2.3.2</u>.

~~C403.4.3.3.1~~ <u>C403.4.2.3.1</u> Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F (11.1°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

~~C403.4.3.3.2~~ C403.4.2.3.2 Heat rejection. Heat rejection equipment shall comply with Sections ~~C403.4.3.3.2.1 and C403.4.3.3.2.2~~. C403.4.2.3.2.1 and C403.4.2.3.2.2

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

~~C403.4.3.3.2.1~~ C403.4.2.3.2.1 Climate Zones 3 and 4. For climate zones 3 and 4:

1. If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.
2. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
3. If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

~~C403.4.3.3.2.2~~ C403.4.2.3.2.2 Climate Zones 5 through 8. For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

~~C403.4.3.3.3~~ C403.4.2.3.3. Two position valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 kW) shall have a two-position valve.

~~C403.4.3.4~~ C403.4.3.3 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87 930 W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply-water temperatures using zone-return water temperature, building-return water temperature, or outside air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; or
2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other *approved* means.

~~C403.4.3.5~~ C403.4.3.4 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

2012C has multiple conflicts:

a. Air economizer only applied to simple systems.
b. Water systems and references to "cooling" within the Simple System language (C403.3.1)
c. Directing language that should apply to all economizer types was only under Complex (Integrated economizer, economizer control, relief of outdoor air). This language moved to Section 403.3.1 (basic economizer requirements, which requires either air or water economizers).
d. Section C403.3.2, Hydronic system controls (under Simple Systems) references "chilled water", which is not a simple system. This same language is duplicated under Section C403.4.3.4 (Part Load controls). All hydronic controls are combined under this proposal to be under the retitled Section "C403.4 ~~Complex~~ Hydronic and multi-zone HVAC systems controls and equipment. (Prescriptive)". Any special multi-zone or hydronic requirements (formerly complex system) are under this section.
e. A complex system could have air and water economizers. Where exceptions apply becomes a complicated process.
f. Language in Section 403.3 (simple systems), includes references to Tables C403.2.3(1) through C403.2.3(8), which includes all equipment, including centrifugal chillers and cooling towers (always part of a complex system).

Complex and simple systems do not have a use in the IECC. These systems have no definitions. There are no other references to these systems anywhere else in the IECC. The need for these divisions in the IECC is no longer necessary and only leads to confusion and/or conflicting code requirements as noted in this proposal.

The intent of this proposal is to do the following:

1. An Economizer section with general requirements for all economizers in the same location. Requirements for Air and Water economizers are outlined. Exceptions are the same for either economizer type.
2. Complex Systems becomes a general prescriptive section for hydronic and multiple zone systems and the control of these systems.

A key element to making the revised provisions work, is revision to Section 403.1. As it stands in the 2012 code, Section 403.1 has a serious flaw that allows you to pick and choose a compliance path by saying "use either simple or complex" path requirements. The language is an "either A or B". It does not have a path to use both simple and complex when you have a building with both equipment types. It also allows cherry-picking of a path.

Section 403.1 does NOT require that a chilled water systems use the complex system Section 403.4 control/pump requirements. It can pick the Section 403.3 simple system path. A building can install an air economizer on a 100 ton (chilled water) VAV rooftop and not have to meet ANY of the requirements of Section 403.4 for VAV systems… And since an air economizer is included with most every VAV rooftop, that creates a gaping hole in code. And very little applies code will apply to a boiler or chiller you may have on the site.

Cost Impact: The 2012 code was flawed and the result would be inconsistent application of the economizer provisions. Because the 2012 does state specifically that an economize is required for complex systems, this could be viewed as an increase to the cost of construction. However since the energy savings envisioned by the balance of the HVAC requirements would not be realized without an installed economizer, most systems would be provided with one (or more) anyway.

C403.1-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: While the committee saw the value in reorganizing these provisions and making their application clearer, the proposal needed to better address chilled water.

Assembly Action: Approved as Submitted

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted and public comments.

Public Comment 1:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair; Jeremiah Williams, U.S. Department of Energy, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided.

C403.3 Economizers (Prescriptive). ~~This section applies to buildings served HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8).~~ **~~C403.3.1 Economizers.~~** Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections ~~C403.3.1.1~~ C403.3.1 through ~~C403.3.1.1.4~~ C403.3.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table ~~C403.3.1(1).~~ C403.3(1)
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3~~.1~~(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table ~~C403.3.1(2).~~ C403.3(2)

~~C403.3.1.1~~ C403.3.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

~~C403.3.1.2~~ C403.3.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

Exception: Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

Table ~~C403.3.1(1)~~ C403.3(1)
ECONOMIZER REQUIREMENTS

Table ~~C403.3.1(2)~~ C403.3(2)
EQUIPMENT EFFICIENCY
PERFORMANCE EXCEPTION FOR ECONOMIZERS

~~C403.3.1.3~~ C403.3.3 Air economizers. Air economizers shall comply with Sections ~~C403.3.1.3.1~~ C403.3.3.1 through ~~C403.3.1.3.4.~~ C403.3.3.4

~~C403.3.1.3.1~~ C403.3.3.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

~~C403.3.1.3.2~~ C403.3.3.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.

Exception: The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

~~**C403.3.1.3.3**~~ **C403.3.3.3 High-limit shutoff.** Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table ~~C403.3.1.3.3(1).~~ C403.3.3.3(1) High-limit shutoff control settings for these control types shall be those specified in Table ~~C403.3.1.3.3(2).~~ C403.3.3.3(2)

Table ~~C403.3.1.3.3(1)~~ C403.3.3.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

Table ~~C403.3.1.3.3(2)~~ C403.3.3.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

~~**C403.3.1.3.4**~~ **C403.3.3.4 Relief of excess outdoor air.** Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

~~**C403.3.1.4**~~ **C403.3.4 Water-side economizers.** Water-side economizers shall comply with Sections ~~C403.3.1.4.1~~ C403.3.4.1 through ~~C403.3.1.4.2~~ C403.3.4.2

~~**C403.3.1.4.1**~~ **C403.3.4.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.

Exception: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

~~**C403.3.1.4.2**~~ **C403.3.4.2. Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

C403.4 Hydronic and multi-zone HVAC system controls and equipment. (Prescriptive). ~~This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3.~~ Hydronic and multi-zone HVAC system controls and equipment shall comply with this section.

(Portions of proposal not shown remain unchanged)

Commenter's Reason:
(Thompson): At the code development hearing it was noted that the language originally intended to define simple systems was applied to economizers in the proposal. As a result, the new economizer charging paragraph no longer included requirements for economizers on air handlers with chilled water coils, as they are not listed in Tables C403.2.3(1) through C403.2.3(8). The stated intent of the original proposal was to eliminate the distinction between simple and complex systems and reduce confusion in the code. There was no intent to reduce economizer requirements in the code, which was the reason given by the committee for disapproval.

The modifications proposed in this public comment addresses the committee's reason for disapproval by maintaining the current economizer requirements, and renumbering the sections and tables as needed. There is also remaining language related to the complex and simple systems in section C403.4 that the proposed modification removes. The SEHPCAC believes that the modification adjusts the proposal to align with the original proponent's intent and corrects the unintended oversight noted by the committee that would have reduced the provisions in the code for economizers on air handling units associated with chilled water coils.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

(Williams): At the code development hearing, DOE noted that the language originally intended to define simple systems was applied to economizers in the proposal. As a result, the new economizer charging paragraph no longer included requirements for economizers on air handlers with chilled water coils, as they are not listed in Tables C403.2.3(1) through C403.2.3(8). The stated intent of the original proposal was to eliminate the distinction between simple and complex systems, and reduce confusion in the code. We believe there was no intent to reduce economizer requirements in the code, which was the reason given by the committee for disapproval.

The modification proposed in the public comment addresses the committee reason for disapproval by maintaining the current economizer requirements, and renumbering the sections and tables as needed. There is also remaining language related to the complex and simple systems in section C403.4 that the proposed modification removes. DOE believes the modification adjusts the proposal to align with the original proponent's intent, and corrects the unintended oversight by the proponent noted by the committee that would have reduced the provisions in the code for economizers on air handling units associated with chilled water coils.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE241-13

Final Action: AS AM AMPC____ D

CE244-13
C403.3.1, Table C403.3.1(1)

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).
7. Systems under 110,000 Btu/h total cooling capacity that utilize multiple stage cooling capacity control and multiple speed fan control.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ~~≥ 33,000~~ ≥ 54,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

The current trigger values for economizers are in conflict with current ASHRAE Standard 90.1. The modification to the 2012 IECC was based on the Green standard 189.1 additional energy measures; prescriptive requirements should not come from an optional code or standard. ASHRAE 90.1 reduced their trigger to 54,000 Btu/h in the 2010 version and is not decreasing the trigger in any addenda for the 2013 version. Intent is to align the code and standard. For 2013, California Title 24 revisited economizers and did not drop their trigger value below 54,000 Btu/h. No other mandatory code or standard has reduced below 54,000 Btu/h.

The first part of this proposal recommends matching Table C403.3.1(1) to the trigger to other codes and standards.

The second part of this proposal allows for one additional exception: small units (under 110,000 Btu/h) are not required to have an economizer if the units have multiple speed fans and multiple stage cooling capacity.

For this proposal, the efficiency measure is similar to a prescriptive requirement that California added for small units. We are proposing an exception to economizers for small units. As part of the 2013 California Title 24 proposals, multiple stage compressor and fan control for small HVAC units (under the current 110,000 Btu/h trigger for multiple speed fans) was economically viable as a prescriptive measure and was included in Title 24.

http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/HVAC/2013_CASE_NR_Fan_Control_Integrated_Economizers_Sept_2011.pdf has the complete report. Taylor Engineering performed the energy modeling. They report a possible 2-year payback for addition of multi-speed compressor & fan.

Per cost figures furnished to California by Dick Lord of Carrier, this proposed exception would be less than or equal to the cost of an economizer. So there is no cost impact.

Oregon BCD energy modeling used the Taylor Engineering baseline concept. We looked at the same building with these small HVAC units. We compared a building without economizers (not required in California for the HVAC size range) with the same units with economizer and with just the multi-speed configuration. Adding multi-speed configuration saves nearly 4-times more energy than adding an economizer.

So the proposed exception not only has an equal or lower cost, it will save a greater amount of energy.

Additional study performed by PNNL of economizers and other measures for small packaged HVAC equipment provides additional insight. PNNL Study #PNNL-20995 (http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20955.pdf), even though relative to retrofit of existing equipment, gives insight on the relative effectiveness of economizers, multi-speed control and Demand Control Ventilation (DCV). Multi-speed control is a more effective conservation measure than an economizer. See page 37:

- Multi-speed fan control and DCV are the two control strategies that contribute most to the HVAC energy savings. Specifically, multi-speed fan control dominates the impact in a small number of cases, including all four building types in Miami and the small office building in Houston, Phoenix and Los Angeles. DCV dominates the impact for all other cases. The multi-speed fan contribution to savings can be negative in cold climates (e.g, Duluth and Fairbanks for all building types).

- Adding an air-side economizer after multi-speed fan control does not have a large impact on HVAC energy savings except for a few cases, such as the small office building in Los Angeles. In comparison with a nonintegrated economizer, the integrating economizer has negligible impact on HVAC energy savings.

Overall, this proposal provides both alignment with other standards and codes and is an improvement in energy conservation for anyone taking the new exception path.

So we are basing a request for modifying the levels on additional analysis conducted by Oregon Building Codes Division.

The analysis methods referenced for this proposal use the same energy models developed by ASHRAE and the Department of Energy (PNNL) for the Final Determination of ASHRAE 90.1-2010 in the Federal Register. We used the US DOE prototype energy model files and EnergyPlus software. NO new models were used; the simulation software was the same. Weighting of building types was the same as used by PNNL. Only buildings from the 90.1 determination that have packaged HVAC units in this size range were considered (not office buildings with VAV units). See these studies by PNNL for the analysis:

1. For the description for the modeling method http://www.energycodes.gov/sites/default/files/documents/BECP_Energy_Cost_Savings_STD2010_May2011_v00.pdf
2. The DOE certification of 90.1-2010 (references the linked PNNL-20405 above) http://www.energycodes.gov/sites/default/files/documents/BECP_FinalQuantitativeAnalysisReport901-2010Determination_Oct2011_v00.pdf

The national weighted-average annual energy savings per economizer for systems between 33,000 Btu/h and 110,000 Btu/h is $41 per year per economizer. Using a first cost of $750/economizer (including installation, set-up, initial testing) and a 15-year life cycle, economizers never provide a return on the cost premium, much less recover the cost of maintenance. On the basis of these models, we feel the trigger levels should be re-examined. Weighting of life cycle costs were based on EIA national average utility costs, 15-year life cycle and 3% discount rate for the $750 average first cost and $50/year for maintenance.

The table below is the raw data of savings per economizer by building type and climate zone. Weighting used the same data from the DOE/PNNL studies. Green highlights show over $85/year, which might cover first costs and maintenance.

ANNUAL SAVINGS PER ECONOMIZER (RAW DATA)

BUILDING PROTOTYPE/ CLIMATE ZONE	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Fast Food Restaurant					$ 65		$ 135	$ 94		$ 87		$ 82	$ 69	$ 38
Small Hotel	$ 109	$ 123	$ 128	$ 108		$ 85		$ 80	$ 80	$ 67	$ 82		$ 63	
Strip Mall Retail	$ 18	$ 26	$ 16	$ 41	$ 76	$ 22	$ 32	$ 75	$ 29	$ 50	$ 54	$ 58	$ 37	$ 31
Strip Mall Office	$ 18	$ 4	$ 11	$ 23		$ 26	$ 34	$ 33	$ 25	$ 29	$ 35	$ 32	$ 28	$ 23
Warehouse	$ 11	$ (14)	$ 9	$ 10		$ 0	$ (1)	$ (3)		$ (2)	$ (3)	$ (4)		$ (3)
Stand Alone Retail	$ 76	$ 99	$ 96	$ 105	$ 210	$ 102	$ 152	$ 130	$ 99	$ 122	$ 123	$ 134	$ 126	$ 119
Primary School	$ 31	$ 35	$ 31	$ 39	$ 105	$ 42	$ 57	$ 48	$ 41	$ 49	$ 42	$ 135	$ 160	$ 163

When looking at the Life Cycle Costs by building type, there is not a return on investment. And this simulation considers a perfectly functioning economizer. If the weighting were to include a factor for non-functioning economizers, becomes difficult to justify any economizer below 110,000 Btu/h.

WEIGHTED LIFE CYCLE COST BY BUILDING TYPE							
BUILDING TYPE	**FAST FOOD**	**SMALL HOTEL**	**STRIP MALL**	**SMALL OFFICE**	**WAREHOUSE**	**STAND-ALONE RETAIL**	**PRIMARY SCHOOL**
WEIGHTED LCC	($288)	($201)	($1,014)	($1,097)	($1,286)	($128)	($875)

Buildings are more efficient due to improvements in the codes. Contributing reasons why these systems no longer viable at the current triggers:

1. Improvements to the building envelope: glazing improvements reduce solar gain; envelope insulation delays thermal conductivity gains.
2. Reduced lighting power: 30-45% reductions from 2006 levels.
3. Equipment efficiency improvements: 30% increase in SEER requirement for 60,000 Btu/h (5-ton) units and smaller.

With less cooling required during the year (the building is more efficient), there is a smaller "pool of energy use" to reduce with this measure. And because of the improved building characteristics, there are fewer hours where cooling needs overlap with outdoor conditions suitable for economizer operation. An economizer on units in this size range has little chance of paying back its cost premium during the life cycle of the unit. The effects of code improvements over the years could not be analyzed without a full energy model. And the DOE/PNNL files are among the best available and are used by DOE for analyzing 90.1.

The current 33,000 Btu/h trigger (thru 110,000 Btu/h) only returns its cost over the life of the equipment when there are either high load conditions (computer closets) or nearly continuous operation (18-24 hours per day, 7-days per week). And positive returns are only found in a few climate zones, not on a national weighting by building type. The 33,000 Btu/h figure should only remain if there are exceptions for smaller units with operating hours of under 112 hours per week (above the 20 hour per week exception already in code) or if there are high internal loads. But this is difficult to put into enforceable code language.

We propose to match the current 90.1-2010 level of 54,000 Btu/h; 90.1 is not considering any further revisions below this level. The weighted average economizer savings increases slightly closer to a level where it might pay back.

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

C403.3.1(1)T-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal removes too many buildings from needing to comply with the economizer requirements.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

7. ~~Systems under 110,000 Btu/h total cooling capacity that utilize multiple stage cooling capacity control and multiple speed fan control.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The Commercial IECC Development Committee concluded that the original proposal would result in too many systems being exempted from the economizer requirement. The proposal is amended to remove the proposed exception 7 which would be the cause of many systems being exempted. The SEHPCAC believes the change from 33,000 to 54,000 in the table is still valid based on the reasons originally submitted, which provides alignment with ASHRAE 90.1 and CE245-13 submitted by ASHRAE, and should be approved. Item 7 has been deleted as its inclusion is not necessary to achieve the stated intent of the original proposal to simply align the economizer requirements with ASHRAE 90.1.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE244-13

Final Action: AS AM AMPC____ D

CE245-13

C403.3.1, Table C403.3.1(1), C403.3.1.4, C4033.1.1.5 (NEW), Table C403.3.1.1.3(2), C403.3.1.2 (NEW), C403.3.1.2.1 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through ~~C403.3.1.1.4.~~ C403.3.1.1.5.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).

7. Systems that include a heat recovery system in accordance with Section C403.4.6.

8. Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and *infiltration* loads, is not more than the transmission and *infiltration* losses at an outdoor temperature of 60°F.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ ~~33,000~~ 54,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

C403.3.1.1.4 Dampers. Return, exhaust/relief, and outdoor air dampers shall in accordance with Section C402.4.5.2

C403.3.1.1.5 Relief of excess outdoor air. Systems shall be capable of relieving excess outdoor air during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

TABLE C403.3.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN): EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	*TOA* > 75°F	Outdoor air temperature exceeds 75°F
	~~5A, 6A, 7A~~	*TOA* > 70°F	Outdoor air temperature exceeds 70°F
	~~All other zones~~	~~*TOA* > 65°F~~	~~Outdoor air temperature exceeds 65°F~~
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	*TOA* > *TRA*	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	~~All~~ 2A, 3A, 4A, 5A, 6A	*hOA* > 28 Btu/lb[a]	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	(*TOA*, *RHOA*) > *A*	Outdoor air temperature/RH exceeds the "A" setpoint curve[b]
Differential enthalpy	All	*hOA* > *hRA*	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry bulb temperatures	All	*DPOA* > 55°F or *TOA* > 75°F	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × $^5/_9$, 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

C403.3.1.2 Water economizers. Water economizers shall comply with Sections C403.3.1.2.1 through C403.3.1.2.2.

C403.3.1.2.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures not greater than 50°F dry bulb/45°F wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F dry bulb/35°F wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb/45°F wet bulb and where 100 percent of the expected system cooling load at 45°F(7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.3.1.2.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet of water (45 kPa) or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

Reason: This proposal makes the air economizer requirements consistent with ANSI/ASHRAE/IES Standard 90.1. Quite a bit of collaboration has gone into this proposal to achieve consensus, and is a result of many years of research investigating the cost effectiveness of economizer use in each climate zone.

In addition, new requirements for water economizers are being added.

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

C403.3.1-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee found the proposed exception #8 to Section 403.3.1 to be vague.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.5.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).
7. Systems that include a heat recovery system in accordance with Section C403.4.6.
8. Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and *infiltration* loads, is not more than the transmission and *infiltration* losses at an outdoor temperature of 60°F.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 54,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

C403.3.1.1.4 Dampers. Return, exhaust/relief, and outdoor air dampers shall in accordance with Section C402.4.5.2

C403.3.1.1.5 Relief of excess outdoor air. Systems shall be capable of relieving excess outdoor air during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

~~**TABLE C403.3.1.1.3(1)**~~
~~**HIGH LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS**~~

TABLE C403.3.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS[b]

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN): EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > 75°F$	Outdoor air temperature exceeds 75°F
	5A, 6A	$T_{OA} > 70°F$	Outdoor air temperature exceeds 70°F
	1a, 2a, 3a, 4a	$T_{OA} > 65°F$	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy with fixed dry-bulb temperature	All ~~2A, 3A, 4A, 5A, 6A~~	h_{OA} > 28 Btu/lb[a] or $T_{OA} > 75°F$	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a] or Outdoor air temperature exceeds 75°F
~~Electronic Enthalpy~~	~~All~~	~~$(T_{OA}, RH_{OA}) > A$~~	~~Outdoor air temperature/RH exceeds the "A" setpoint curve[b]~~
Differential enthalpy with fixed dry-bulb temperature	All	$h_{OA} > h_{RA}$ or $T_{OA} > 75$	Outdoor air enthalpy exceeds return air enthalpy or Outdoor air temperature exceeds 75°F
~~Dew-point and dry bulb temperatures~~	~~All~~	~~$DP_{OA} > 55°F$ or $T_{OA} > 75°F$~~	~~Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)~~

For SI: °C = (°F - 32) × $^5/_9$, 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. ~~Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.~~ Devices with selectable setpoints shall be capable of being set to within 2°F and 2 Btu/lb of the setpoint listed.

C403.3.1.2 Water economizers Water economizers shall comply with Sections C403.3.1.2.1 through C403.3.1.2.2.

C403.3.1.2.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures not greater than 50°F dry bulb/45°F wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F dry bulb/35°F wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb/45°F wet bulb and where 100 percent of the expected system cooling load at 45°F(7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.3.1.2.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet of water (45 kPa) or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

Commenter's Reason: This comment incorporates modifications from a new addendum has been approved to Standard 90.1, which will be incorporated into 90.1-2013. Analysis has shown that temperature and humidity sensor measurement error has a large impact on energy performance of air economizer high limit devices. The analysis shows that by far the most reliable device is the simply dry-blub switch. Even with ±2°F error, it is the best in most climates at set points that are adjusted by climate, lower in humid climates and higher in dryer climates. Differential enthalpy sensors can have the worst performance of all devices because they have four sensors (return air dry bulb and RH and outdoor air dry-blub and RH) each of which can have error. This is true even with very accurate RH sensors, but studies at the Iowa Energy Center have shown that actual accuracy is much worse than nominal accuracy. Thus to ensure enthalpy high limits maintain good performance despite sensor error and when coils are dry, this modification requires that they be used along with fixed dry bulb switches.

Fixed dry-blub switches set to 65ºF in humid climates are reinstated. They was allowed in the 2007 and earlier versions of Standard 90.1 at this setpoint. They were eliminated in 2010 due to concerns about high resulting space humidity, but that concern only applies to single compressor DX units with two stage thermostats and the impact is minimized by the low 65ºF setpoint. With fully integrated economizers, high limit switches have no space humidity impact.

Electronic enthalpy switches are eliminated because they have been supplanted in the marketplace by better performing and lower cost switches that use superior fixed enthalpy plus fixed dry-blub logic.

The dewpoint high limit that was added in the 2004 version is also proposed to be deleted since does not make sense theoretically and did not perform well in our simulations.

The comment also adds tolerances to the high limit change over sensors which are aligned with tolerances recently added to Title 24 2013

Public Comment 2:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).
7. Systems that include a heat recovery system in accordance with Section C403.4.6.
8. ~~Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and *infiltration* loads, is not more than the transmission and *infiltration* losses at an outdoor temperature of 60°F.~~

Commenter's Reason: During the development of 90.1-2013, it was also determined that economizers should not be required for systems that include heat recovery. Exception 7, proposed in the original proposal, reflects that finding. This public comment removes proposed Exception 8, in response to committee comments. Note that Exception 7 will be retained, as originally proposed in this code change proposal. During the development of 90.1-2013, it was also determined that economizers should not be required for systems that include heat recovery. Exception 7, proposed in the original proposal, reflects that finding. This public comment is primarily intended to allow consideration of this exception on its own merits.

CE245-13

Final Action: AS AM AMPC____ D

CE246-13
C202 (NEW), Table C403.3.1.1.3(1)

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C403.3.1.1.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy~~[a]~~ Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy~~[a]~~ Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy~~[a]~~ Differential enthalpy Dew-point and dry-bulb temperatures	—

~~a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.~~

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

ELECTRONIC ENTHALPY CONTROLLER. A device that uses a combination of humidity and dry bulb temperature in its switching algorithm.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The footnote is a definition of a device. It provides no information that enhances the enforcement of the table other than defining one of the pieces of equipment. Chapter 2 is the preferred location for definitions. If this is approved, the SEHPCAC will submit a companion code change in 2014 to address parallel provisions in the IgCC.

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

C403.3.1.3(1)T-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed definition doesn't address devices which may be digital or analog.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Submitted.

Commenter's Reason: The Commercial IECC Development Committee disapproved this simple proposal based on the concept that there were multiple types of electronic enthalpy devices. While there may be, the SEHPCAC proposal was simple, take what appears to be an existing definition, buried in a footnote and relocate it to Chapter 2 – the home of definitions. If there is a change in technology, we leave it to others to address changing the code to address that issue. Our proposal is a simple relocation of existing text.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE246-13
Final Action: AS AM AMPC____ D

CE250-13

C403.4.1.3, Table C403.4.1.3 (NEW), C403.4.2.1 (NEW), Table C403.4.2.1 (NEW), C403.4.2.1, C403.4.2.2, C403.4.7

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.1.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load. Controls shall not be capable of creating a false load the mechanical cooling systems by limiting or disabling the economizer or any other means, such as hot gas bypass except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the 100 percent open position when *mechanical cooling* is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F.
2. DX units that control 75,000 Btu/h or greater of rated capacity of the capacity of the mechanical cooling directly based on occupied space temperature shall have no fewer than 2 stages of mechanical cooling capacity
3. All other DX units including those that control space temperature by modulating the airflow to the space shall be in accordance with Table C403.4.1.3

~~**Exceptions:**~~

~~1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.~~
~~2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

TABLE C403.4.1.3
DX COOLING STATESTAGE REQUIREMENTS FOR MODULATING AIRFLOW UNITS

Rating Capacity	Minimum Number of Mechanical Cooling Stages	Minimum Compressor Displacement[a]
≥65,000 Btu/h and <240,000 Btu/h	3 stages	≤35% of full Load
≥240,000 Btu/h	4 stages	≤25% full load

a. For *mechanical cooling* stage control that does not use variable compressor displacement the percent displacement shall be equivalent to the mechanical cooling capacity reduction evaluated at the full load rating conditions for the compressor.

C403.4.2 ~~Variable air volume (VAV)~~ fan control. ~~Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:~~

~~1. Driven by a mechanical or electrical variable speed drive;~~

2. ~~Driven by a vane-axial fan with variable-pitch blades; or~~
3. ~~The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data~~

C403.4.2.1 Fan airflow control Each cooling system listed in Table C403.4.2.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements.

1. DX and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have no fewer than 2 stages of fan control. Low or minimum speed shall not exceed 66 percent of full speed. At low or minimum speed the fan system shall draw no more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation only operation.

2. All other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall not exceed 50 percent of full speed. At minimum speed the fan system shall draw no more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation only operation.

3. Units that include an airside economizer to meet the requirements of Section C403.3.1 shall have no fewer than of 2 speeds of fan control during economizer operation

   Exceptions:

   1. Modulating fan control is not required for chilled water and evaporative cooling units with fan moters of less than 1 HP where the units are not used to provide *ventilation air* and the indoor fan cycles with the load.

   2. Where the volume of outdoor air required to meet the *ventilation* requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the speed defined in Section C403.4.2 then the minimum speed shall be selected to provide the required *ventilation air*.

TABLE C403.4.2.1
EFFECTIVE DATES FOR FAN CONTROL

Cooling System Type	**Fan Motor Size**	**Mechanical Cooling Capacity**
DX Cooling	any	≥75,000 Btu/h (before 1/1/2016)
		≥65,000 Btu/h (after 1/1/2016
Chilled Water and Evaporative cooling	≥5 HP	Any
	≥1/4 HP	Any

~~**C403.4.2.1**~~ **C403.2.2 VAV Static pressure sensor location.** Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

~~**C403.4.2.2**~~ **C403.4.2.3 VAV Set points for direct digital control.** For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open.

C403.4.7 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.4.7 as limited by Section C403.4.1.3

> ~~**Exception:** Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26 379 W).~~

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, does not contain the exceptions that are shown in the IECC. Those exceptions were in standard 90.1-2007 but were removed in standard 90.1-2010. The change ensures continued consistency between the IECC and standard 90.1-2010.

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

C403.4.1.3-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee did not feel sufficient justification for the change was provided.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Submitted.

Commenter's Reason: Integrated economizers allow for the use of economizers and mechanical cooling to meet the cooling loads of the building. With advanced controls for economizers it is now possible to eliminate the exception 6.5.1.3c which exempted zones 1, 2, 3a, 4a, 5a, 5b, 6, 7 and 8 from using integrated economizers. The results of the analysis showed a market volume weighted average cooling energy savings for the HVAC system cooling power of 24% for the small office, 22.1% for a large office, and 33% for a hospital.

This makes changes to the requirements for fan control for both constant volume and VAV units including extending the fan part load power requirements down to ¼ HP In addition it defines the requirements for integrated economizer control and defines DX unit capacity staging requirements.

A full economic analysis has been done using the 2013 economic scalar justification requirements and payback periods of 0.6 to 4.2 years have been estimated and with a design life of 15 years is well below the scalar limit of 9.086 yrs used by SSPC 90.1

For clarification we have included most of the text from these sections so it is easier to understand the changes being made.

CE250-13
Final Action: AS AM AMPC____ D

CE251-13
C403.4.2.1, C403.4.2.2

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.2.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be ~~placed in a position~~ located such that the controller setpoint is no greater than ~~one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2~~ 1.2 inches w.c. ~~For sensors~~ Where this results in one or more sensors being ~~installed~~ located down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.2.2 Set points for direct digital control. For systems with direct digital control of individual ~~*zone* boxes~~ zones reporting to the central control panel, the static pressure set point shall be reset based on the zone requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open. The direct digital controls shall be capable of monitoring zone damper positions; or shall have an alternative method of indicating the need for static pressure which is capable of all of the following:

1. Automatically detecting any zone which excessively drives the reset logic;
2. Generating an alarm to the system operational location; and
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to controls for certain aspects of HVAC systems. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction where controls will now be required.

C403.4.2.1-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the location of static pressure sensors in relationship to VAV fans and systems with direct digital controls.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE251-13
Final Action: AS AM AMPC____ D

CE252-13
C403.4.3.3.2, C403.4.3.3.2.1, C403.4.3.3.2.2

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.3.3.2 Heat rejection. For heat pump systems ~~Heat rejection equipment~~ ~~shall comply with Sections C403.4.3.3.2.1 and C403.4.3.3.2.2.~~ in Climate Zones 3 through 8:

1. Where a closed-circuit cooling tower is used directly in the heat pump loop, one of the following shall be provided:.
   1.1 An automatic valve capable of providing a bypass to all but a minimal flow of water around the tower; or
   1.2 Low leakage positive closure dampers.
2. Where an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed capable of providing a bypass of all heat pump water flow around the tower.
3. Where an open-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be capable of being controlled by shutting down the circulation pump on the cooling tower loop.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

~~**C403.4.3.3.2.1 Climate Zones 3 and 4.** For Climate Zones 3 and 4:~~

1. ~~If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.~~
2. ~~If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.~~
3. ~~If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.~~

~~**C403.4.3.3.2.2 Climate Zones 5 through 8.** For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.~~

Reason: For consistency with ASHRAE/IES 90.1-2010. . As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 the issue of energy use for freeze protection systems must also be addressed in the IECC. These requirements for heat pump heat loss have been in 90.1 for a few years. This change will bring the requirements in line with 90.1.

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

C403.4.3.3.2-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval because the reason statement lacked sufficient information for the committee to take action.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Submitted.

Commenter's Reason: The original proposal was disapproved because it lacked sufficient justification.

Here is additional justification for the change.

Heat rejection for a hydronic heat pump loop can be provided by a closed circuit cooling tower, an open circuit cooling tower / heat exchanger combination, or an open circuit cooling tower. This change is justified as the heat rejection requirements for hydronic heat pump systems for all three heat rejection types should apply equally to climate zones 3 through 8, rather than separate requirements for Climate Zones 3 and 4 and Climate Zones 5 through 8. This is because the requirements are actually the same except for the mis-directed constraint in C403.4.3.3.2.2 calling for a secondary heat exchanger in Climate Zones 5 through 8.

The additional heat exchanger currently called for in climate zones 5 through 8 is unnecessary for systems utilizing any of the three options for heat rejection mentioned above. This requirement adds substantial, unnecessary cost to such systems, especially the case where a closed circuit cooling tower is utilized (a closed circuit tower combines the functions of a heat exchanger and cooling tower in one compact unit). For the case where an open tower is used without an isolation heat exchanger, there is a requirement for a bypass around the tower to prevent unnecessary heat loss in the proposed text.

Besides correcting the discrepancy in this section, this new language makes the IECC language consistent with ASHRAE/IES 90.1-2010 while at the same time simplifying the code language. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with Standard 90.1, this issue must be addressed. Note that the requirements for hydronic heat pump heat loss have been in Standard 90.1 for many years and this change will bring the requirements in line with Standard 90.1.

CE252-13
Final Action: AS AM AMPC____ D

CE254-13
C202 (NEW), C403.4.3.5 (NEW), Table C403.4.3.5 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.3.5 Boiler Turndown. *Boiler systems* with design input of greater than 1,000,000 Btu/h shall comply with the turndown ratio specified in Table 403.4.3.5.

The system turndown requirement shall be met through the use of multiple single input boilers, one or more *modulating boilers* or a combination of single input and modulating boilers.

TABLE 403.4.3.5
BOILER TURNDOWN

Boiler System Design Input (Btu/h)	Minimum Turndown Ratio
≥ 1,000,000 and less than or equal to 5,000,000	3 to 1
> 5,000,000 and less than or equal to 10,000,000	4 to 1
> 10,000,000	5 to 1

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

BOILDER, MODULATING. A boiler that is capable of more than a single firing rate in response to a varying temperature or heating load.

BOILER SYSTEM. One or more boilers, their piping and controls that work together to supply steam or hot water to heat output devices remote from the boiler.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to include boiler turndown requirements for boilers larger than 1,000,000 Btu/h. These requirements are in addition to the efficiency requirements in TABLE C403.2.8. The change ensures continued consistency between the IECC and Standard 90.1-2010.

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

C403.4.3.5-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The definitions are needed to properly regulate boilers. The provision for part loads allow the boilers to be more efficient.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE254-13
Final Action: AS AM AMPC____ D

CE255-13

C403.4.4, C403.4.4.1 (NEW), C403.4.4.2 (NEW), C403.4.4.2.1 (NEW), C403.4.4.2.2 (NEW), C403.4.4.3, C403.4.4.4 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.4 Heat rejection equipment ~~fan speed control~~. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables C403.2.3(6) and C403.2.3(7).

C403.4.4.1 General. Heat rejection equipment such as air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers, and evaporative condensers used for comfort cooling applications shall comply with this section.

Exception: Heat rejection devices whose energy usage is included in the equipment efficiency ratings listed in Tables C403.2.3 (6) and C403.2.3 (7).

C403.4.4.2 Fan speed control. The fan speed shall be controlled as follows:

C403.4.4.2.1 Fan motors at least 7.5 hp. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exceptions: The following fan motors over 7.5 hp are exempt:

1. Condenser fans serving multiple refrigerant circuits.
2. Condenser fans serving flooded condensers.
3. Installations located in climate zones 1 and 2.

C403.4.4.2.2 Multiple cell heat rejection equipment. Multiple cell heat rejection equipment with variable speed fan drives shall:

1. Be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components, and
2. Be controlled so all fans can operate at the same fan speed required for the instantaneous cooling duty as opposed to staged (on/off) operation.

Minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

C403.4.4.3 Limitation on centrifugal fan open-circuit cooling towers. Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1100 gpm or greater at 95°F condenser water return, 85°F condenser water supply, and 75°F outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table C403.2.3(8).

Exception: Centrifugal open-circuit cooling towers that designed with inlet or discharge ducts or require external sound attenuation.

C403.4.4.4 Tower flow turndown. Open circuit cooling towers used on water cooled chiller systems that are configured with multiple or variable speed condenser water pumps shall be designed so that all open circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell.

Reason: ASHRAE/IES Standard 90.1, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to enhance the provisions applicable to cooling tower controls and supports further reductions in energy use. The change ensures continued consistency between the IECC and 90.1.

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

C403.4.4-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Enhances standards for cooling tower controls and will allow a savings of energy. Industry has developed these improved standards

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE255-13
Final Action: AS AM AMPC____ D

CE257-13
C403.4.5

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferuson@ashrae.org)

Revise as follows:

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.3 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code.*
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in *outdoor air* intake for the system, as *approved* by the *code official*.
5. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

Exception: The following define where individual *zones* or where entire air distribution systems are exempted from the requirement for VAV control:

~~1. *Zones* where special pressurization relationships or cross-contamination requirements are such that VAV systems are impractical.~~

~~2.~~ 1. *Zones* or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.

~~3.~~ 2. *Zones* where special humidity levels are required to satisfy process needs.

~~4.~~ 3. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.

~~5.~~ 4. *Zones* where the volume of air to be reheated, recooled or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.

~~6.~~ 5. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. The exception is important to allow optimization of multi-zone system ventilation, and saves significant energy nationally. The change ensures continued consistency between the IECC and standard 90.1-2010.

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

C403.4.5 #2-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides for optimization of multi-zones systems and gives the code official the authority to accept systems which are shown to be more energy efficient. There was concern that the wording, especially of new item 4 was vague.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C407.5.2(3)
SPECIFICATIONS FOR THE STANDARD REFERENCE DESIGN HVAC SYSTEM DESCRIPTION

d. **VAV:** ~~Constant Volume can be modeled if the system qualifies for Exception 1, Section C403.4.5.~~ Where the proposed design system modeled has a supply, return or relief fan motor 25 horsepower (hp) or larger, the corresponding fan in the VAV system of the standard reference design shall be modeled assuming a variable speed drive. For smaller fans, a forward-curved centrifugal fan with inlet vanes shall be. If the proposed design's system has a direct digital control system at the zone level, static pressure setpoint reset based on zone requirements in accordance with Section C403.4.1 shall be modeled.

(Portions of Table not show remain unchanged)

Commenter's Reason: In the original version of CE257, Exception 1 to Section 403.4.5 was deleted. Upon review of Table C407.5.1(3), there's a reference to that deleted exception in the existing IECC. This comment seeks to remove the reference to that exception as it would no longer be applicable if CE257 were approved as submitted.

CE257-13
Final Action: AS AM AMPC____ D

CE258-13
C403.4.5.4 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.5.4 Fractional HP fan motors. Motors for fans that are 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70 percent rated in accordance with DOE 10 CFR 431 . These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing in lieu of a varying motor speed shall be permitted.

> **Exception** Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. Research conducted by the Califronia Energy Commission and others indicates that Electronically Commutated Motors (ECM) are more efficient and are cost effective compared to standard (e.g. PSC) motors in applications where the fan runs many hours per day (e.g. toilet exhaust fans, series fan-powered VAV boxes, and fan-coil units) other than those in the airstream that operate only when heating a space since the motor in that case behave essentially as an electric resistance heater. ECMs also reduce energy because their speed can be adjusted for balancing rather than throttling dampers. (ECMs can also be used for variable speed capacity control but that is not a requirement of this section.). The change ensures continued consistency between the IECC and standard 90.1-2010.

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

C403.4.5.4 (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modified the proposal as follows:

~~**Exception**~~ **Exceptions:**

1. Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.
2. Motors in space conditioning equipment that comply with Section C403.2.3.

(Portions of proposal not shown remain unchanged)

Committee Reason: The modification provides coordination with motors regulated by Section C403.2.3. The proposal adds efficiency requirements for smaller motors not regulated by Section C403.2.3.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.4.5.4 Fractional HP fan motors. Motors for fans that are 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70 percent rated in accordance with DOE 10 CFR 431 . These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing in lieu of a varying motor speed shall be permitted.

Exceptions: The following motors are not required to comply with this section:

1. Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.
2. Motors in space conditioning equipment that comply with Section C403.2.3 or C403.2.10.
3. Motors that comply with C405.8

Commenter's Reason: Proposal CE331 was approved as submitted by the code development committee, which adds requirements for electric motors covered by federal law in Section C403.4.5.4. Previously this section of the code did not exist.

The intent of this modification is to be consistent with CE-331, and to exempt those motors that currently have and will have their efficiency requirements established by the US Department of Energy. In other words, this comment will exempt those electric motors that are already covered by federal law as shown in CE-331.

In addition, section 403.2.10 exempts individual exhaust fans less than 1 hp, and the intent of this proposal was not to address the efficiency of those exhaust fan motors.

CE258-13

Final Action: AS AM AMPC____ D

CE259-13
C403.4.5.5 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.5.5 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in *system ventilation efficiency* (E_v) as defined by the *International Mechanical Code*.

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems having exhaust air energy recovery complying with Section C403.2.6.
3. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has requirements for ventilation optimization control on VAV systems that are not included in the IECC. These provisions provide significant energy savings. The change ensures continued consistency between the IECC and standard 90.1-2010 and provides significant energy savings in IECC.

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

C403.4.5.5 (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Where VAV's are optimized for multi-zone designs significant energy savings can be realized.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE259-13
Final Action: AS AM AMPC____ D

CE260-13
C403.4.8 (New)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.8 Window switch controls. Any conditioned space with operable wall or roof openings to the outdoors shall be provided with controls that, when any such opening is open:

1. Disable mechanical heating or reset the heating set point to 55°F or lower.
2. Disable mechanical cooling or reset the cooling set point to 90°F or greater unless the outside air temperature is below the conditioned space temperature

    Exceptions: These controls are not required for:

    1. Building entries with automatic closing devices
    2. Any space without a thermostat
    3. Alterations to existing buildings

Reason: When a space with operable windows has non-integrated mechanical heating and cooling, it is likely that annual HVAC energy will be increased when compared to the same space without operable windows. This can be attributed to operable windows being left open when conditions are not favorable, resulting in high infiltration loads on the HVAC system. There are many reasons why windows are opened when conditions are not favorable:

1. Occupant wants more fresh air and is inconsiderate or unaware of the energy penalty of opening the window when indoor/outdoor conditions are not favorable. This is particularly likely when the HVAC system has sufficient capacity to maintain the space indoor temperature at setpoint despite the increased infiltration load.
2. Occupant does not have sufficient information regarding the indoor air temperature, outdoor air temperature, or HVAC mode of operation to properly determine if opening the window will reduce or increase energy use.
3. Occupant opened the window during favorable conditions, but left the room while the window was open. During their time away from the space, the conditions transitioned to unfavorable.

The intent of this measure is to reduce unnecessary use of energy for heating or cooling of additional un-tempered air if an operable window is left open outside of times when it is beneficial to leave it open. This is accomplished with a simple mechanical switch that integrates the HVAC system operation with operable window position.

The change ensures continued consistency between the IECC and Standard 90.1-2010.

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

C403.4.8-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval to review the cost impact justification.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.4.8 *Door* ~~Window~~ Switches. Any *conditioned space* with a *door*, including doors with more than one-half glass, ~~operable wall or roof~~ openings~~s~~ to the outdoors shall be provided with controls that, when any such ~~opening~~ *door* is open:

1. Disable mechanical heating or reset the heating set point to 55°F or lower within 5 minutes of the door opening.
2. Disable mechanical cooling or reset the cooling set point to 90°F or greater. Mechanical cooling may remain enabled if outside air temperature is below space temperature within 5 minutes of the door opening.

Exceptions:

1. Building entries with automatic closing devices
2. Any space without a thermostat
3. Alterations to existing buildings
4. Loading docks

Commenter's Reason: *Based on public review comments received by ASHRAE, as well as recent votes by the 90.1 committee, the modifications shown alter the scope of this proposal, to be consistent with ASHRAE 90.1. The intent of this measure is to reduce unnecessary use of energy for heating or cooling of additional un-tempered air if an operable door is left open outside of times when it is beneficial to leave it open. This is accomplished with a simple mechanical switch that integrates the HVAC system operation with operable door position.*
It was determined that requiring these switches on all windows was impractical and not cost effective, so the scope has been reduced to only include switches on doors rather than all openings.

Public Comment 2:

Duane Jonlin, City of Seattle, Department of Planning & Development, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

C403.4.8 ~~Window s~~Switch controls for exterior openings. Any conditioned space with operable wall or roof openings to the outdoors shall be provided with controls that, when any such opening is open:

1. Disable mechanical heating or reset the heating set point to 55°F or lower.
2. Disable mechanical cooling or reset the cooling set point to 90°F or greater unless the outside air temperature is below the conditioned space temperature

Exceptions:

1. These controls are not required for:
   1.1. Building entries with automatic closing devices
   1.2. Any space without a thermostat
   1.3. Alterations to existing buildings
2. Controls are permitted to be configured so that the heating or cooling is not disabled and the set points are not reset when the opening remains open for time periods not exceeding two minutes.

Commenter's Reason: We support acceptance this code provision, as it saves significant energy by ensuring that the furnace or air conditioning system is not running while the windows are open.

Two modifications are proposed in this public comment: The title should be changed to clarify that the section applies to all "wall and roof openings to the outdoors" as stated in the text, and not just to windows. The added exception prevents rapid cycling of the HVAC system as people come and go through exterior doors.

CE260-13
Final Action: AS AM AMPC____ D

CE270-13, Part I
C404.5, IPC [E] 607.5

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THE COMMITTEE.

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

PART I-IECC-COMMERCIAL PROVISIONS

Delete and substitute as follows:

~~**C404.5 Pipe insulation.** For Automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft2 × °F (1.53 W per 25 mm/ m2 × K). The first 8 feet (2438 mm) of piping in non-hot water-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h × ft2 × °F (1.53 W per 25 mm/m2 × K).~~

> ~~**Exception:** Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft2 × °F (1.53 W per 25 mm/m2 × K).~~

C404.5 Pipe insulation. Piping in circulating hot water systems and heat-trace temperature maintenance systems shall be insulated in accordance with Table C403.2.8. In hot water systems that have a storage tank and that do not have a circulating hot water system, the first 8 feet (2438 mm) of outlet water piping connecting to a storage water heater or a hot water storage tank shall be insulated in accordance with Table C403.2.8. The pipe between the inlet of a storage tank and a heat trap shall be insulated in accordance with Table C403.2.8.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, references the HVAC piping insulation provisions. The 2012 IECC Commercial Provisions have separate insulation requirements for service water heating piping. It seems logical that the heat loss of the pipe under identical conditions regardless of whether supplying potable water or water for HVAC applications would be the same and should be addressed in the same manner. This situation should be addressed in the IECC to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: This code change proposal will increase the cost of construction where pipe insulation > 1 inch wall thickness is required.

C404.5-EC-FERGUSON.DOC

Committee Action Hearing Results

Part I of this code change was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The heat trace manufacturer's installation instructions could require different insulation requirements than Table C403.2.8.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C404.5 Pipe insulation. Piping in circulating hot water systems and heat-trace temperature maintenance systems shall be insulated in accordance with Table C403.2.8. Where a ~~In~~ hot water system~~s~~ includes ~~that have~~ a storage tank or a storage water heater; and the system does ~~and that do~~ not have a circulating hot water system, the inlet piping to the tank and the outlet piping from the tank shall be insulated in accordance with Table C403.2.8. The extent of the inlet piping insulation shall be from the tank to, and including the piping heat trap required by Section C404.4. The extent of the outlet piping insulation shall be from the tank to a point that is not less than 8 feet (2438 mm) developed length of outlet piping. ~~the first 8 feet (2438 mm) of outlet water piping connecting to a storage water heater or a hot water storage tank shall be insulated in accordance with Table C403.2.8. The pipe between the inlet of a storage tank and a heat trap shall be insulated in accordance with Table C403.2.8.~~

Commenter's Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, references the HVAC piping insulation provisions. The 2012 IECC Commercial Provisions have separate insulation requirements for service water heating piping. It seems logical that the heat loss of the pipe under identical conditions regardless of whether supplying potable water or water for HVAC applications would be the same and should be addressed in the same manner. This situation should be addressed in the IECC to ensure consistency between standard 90.1-2010 and the IECC. More insulation does not negatively impact heat trace products. The insulation values in the tables were found to be cost effective using the ASHRAE cost effectiveness criteria.

The modifications to this proposal improve clarity of the original proposal, and do not substantively modify the original proposal.

CE270-13, Part I
Final Action: AS AM AMPC____ D

NOTE: PART II IS REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE270-13, PART II - IPC

[E] 607.5 Pipe insulation. ~~Hot water piping in automatic temperature maintenance systems shall be insulated with 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft2 • °F (1.53 W per 25 mm/m2 • K). The first 8 feet (2438 mm) of hot water piping from a *hot water* source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft2 • °F (1.53 W per 25 mm/ m2 • K).~~ Piping in circulating hot water systems and heat-trace temperature maintenance systems shall be insulated in accordance with Table C403.2.8 of the *International Energy Conservation Code*. In hot water systems that have a storage tank and that do not have a circulating hot water system, the first 8 feet (2438 mm) of outlet water piping connecting to a storage water heater or a hot water storage tank shall be insulated in accordance with Table C403.2.8 of the *International Energy Conservation Code*. The pipe between the inlet of a storage tank and a heat trap shall be insulated in accordance with Table C403.2.8 of the *International Energy Conservation Code*. This section shall not apply to the piping in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Piping in circulating hot water systems and heat-trace temperature maintenance systems in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be insulated in accordance with R403.4.2 of the *International Energy Conservation Code*.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, references the HVAC piping insulation provisions. The 2012 IECC Commercial Provisions have separate insulation requirements for service water heating piping. It seems logical that the heat loss of the pipe under identical conditions regardless of whether supplying potable water or water for HVAC applications would be the same and should be addressed in the same manner. This situation should be addressed in the IECC to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: This code change proposal will increase the cost of construction where pipe insulation > 1 inch wall thickness is required.

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: **Disapproved**

Committee Reason: The heat trace manufacturer's installations could require different insulation requirements than Table C403.2.8.

Assembly Action: **None**

CE271-13, Part I

C202 (NEW), C404.5, C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.3 (NEW), IPC [E]607.5

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED ONLY FOR INFORMATION PURPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE CODE CHANGES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.5 ~~Pipe~~ Insulation of piping. ~~For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K). The first 8 feet (2438 mm) of piping in non-hot water-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K).~~ Piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5.1, C404.5.2 and C404.5.2.3. Where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be not greater than 0.28 Btu per inch/h•ft^2 • F [0.40 W/(m•K)] for water temperatures less than or equal to 140°F (60°C) and not greater than 0.29 Btu per inch/h•ft^2 • F [0.42 W/(m•K)] for water temperatures greater than 140°F (60°C) and less than or equal to 200°F (93.3°C). Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. This section shall not be construed as requiring insulation on the following:

> ~~**Exception:** Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K).~~

1. The tubing from the connection at the termination of the fixture supply piping to a fixture fitting or a water consuming appliance.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch or less in nominal diameter
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.

C404.5.1 Circulating system piping and heat-traced piping. Heated water circulation system piping shall be insulated in accordance with Table C404.5.1. Piping that is heat-traced to maintain heated water temperature shall be insulated in accordance with Table C404.5.1 or shall have insulation thickness in accordance with the heat tracing manufacturer's requirements. Untraced piping within a heat-traced system shall be insulated in accordance with Table C404.5.1.

TABLE C404.5.1
MINIMUM TUBULAR PIPE INSULATION WALL THICKNESS

NOMINAL PIPE OR TUBE DIAMETER (inches)	**MINIMUM INSULATION WALL THICKNESS (inches)**	
	≤140 °F WATER TEMPERATURE	**>140 °F to 200°F WATER TEMPERATURE**
≤3/8	3/8	3/8
> 3/8 to <3/4	1/2	1/2
≥ 3/4 to <1	3/4	1
≥1 to <1 1/2	1	1 1/2
≥1 ½ to <4	1 1/2	2
≥4 to <8	1 1/2	2
≥8	1 1/2	2

For SI: 1 inch = 25.4 mm, °C= [(°F – 32)/1.8]

C404.5.2 Inlet piping connecting to water heaters and storage tanks. Where a water heater or a heated water storage tank is not equipped with integral heat traps, the inlet piping within 8 feet (2438 mm) of piping length of the water heater or storage tank shall be insulated in accordance with Table C404.5.1. This requirement shall not supersede the water heater manufacturer's requirements for a greater insulation thickness on the inlet piping.

Exceptions:

1. Inlet piping or tubing to a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.

2. Valves, pumps, strainers and threaded unions in water heater or heated water storage inlet piping that is 1 inch (25.4 mm) nominal diameter or less shall not be required to be insulated.

C404.5.3 Other heated water piping. Piping conveying heated water that is not addressed by Sections C404.5.1 and C404.5.2 shall have insulation with a wall thickness of not less than that indicated in Table C404.5.1.

Exceptions:

1. Outlet piping or tubing from a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.

2. Piping or tubing that is completely surrounded by not less than 1 inch (25.4 mm) thickness of building thermal envelope insulation in walls, attics and crawl spaces shall not be required to be insulated with tubular pipe insulation provided that the piping or tubing is 1 inch (25.4 mm) nominal diameter or smaller.

Add new definition as follows:

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Commenter's Reason: This section has generated a lot of questions over the many years since it was put into the IECC. Some people believe that this section requires all hot water piping to have 1 inch insulation. Others believe that this section only requires that hot water circulating system piping (or heat traced piping) have 1 inch of insulation. Another question that arises is what is meant by "hot water" as there is not a definition of such in the IECC. Other questions that arise are "Is the insulation required to be continuous along the piping?" and "Should really small piping and tubing be insulated?" The exception really isn't an exception but requirements for heat-traced systems.

There is no other place in the Commercial Provisions of the IECC that covers the insulation of Service Water Heating piping. This subject is important! In summary, the language in this section is a mess and the words do not clearly state the intended requirements. Let's stop dancing around this important aspect of lessening energy consumption.

The proposed revisions and why:

C404.5
The intent of the struck-out language can be found in new sections C404.5.1 and C404.5.2. The new language for this struck language is discussed later in this reason statement.

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. But what about tempered water (IPC definition of 85F to 110F)? Keep in mind that ASHRAE 90.1-2007 only requires insulation of service water piping conveying water of 105F of greater. It doesn't seem reasonable to say only "hot water" (as defined by the IPC). If necessary, the committee could request a public comment to amend this section to indicate that the section only covers water 105F and greater.

The statement about protection of personnel from external insulation temperatures and freezing conditions is really common sense but it is added for clarity. It also serves as a reminder for the designer to consider these important issues.

The language "The insulation shall be continuous along the piping." was added to answer the obvious and most often asked question. But keep in mind that this requirement could have serious structural implications when piping is routed through light frame construction members (wood studs and joist, metal studs and solid web joists). The holes to accommodate the piping diameter and insulation could become quite large and in some cases, making piping installation very difficult to perform unless soffits and chases are added and wall thicknesses are increased. Again, the committee could express its opinion on this issue by requesting that a public comment for *not* having insulation be continuous through wood studs and joist/metal studs and solid web joists. Either way, this question needs to be answered in a definitive manner.

The list of items where pipe insulation is not required is almost common sense but still, these items need to be stated to avoid confusion and possible misinterpretations by the code officials. Insulating valves is time consuming and if the right type of valve is not used, insulating is almost impossible (think ball valve without a raised handle). A few uninsulated valves in the system are not going to lose a lot of heat. Pumps are also difficult to insulate and in some cases, insulation might cause overheating of the pump motor. Threaded unions usually only occur in smaller diameter piping systems and are time consuming to insulate. Again, a small amount of heat loss compared to the entire system. Piping or tubing from a small tankless water heater serving one sink is too small to easily insulate. The heat loss is negligible.

C404.5.1
The first sentence of this section is saying exactly what the first struck out sentence in C404.5 says. The second sentence picks up the intent of the requirement in the first sentence of the struck out exception.

C404.5.2
The first sentence picks up the intent of the second sentence of struck-out language in C404.5. If a water heater (or heated water storage tank) does not have integral heat traps, there will be standby heat losses from convection of the heated water into the water inlet and outlet piping of the storage water heater or heated water storage tank. Insulating the inlet and outlet piping for 8 feet mitigates this heat loss. But it is not necessary to include the outlet piping in this section because new Section C404.5.3 requires insulating all other piping (which would include the heater or storage tank outlet piping). If the water (or heated water storage tank) serves a circulating system, then there is no convection of heat water into the piping connected to the heater and storage tank--the water is circulating and Section C404.5.1 takes care of the insulating requirement.

The statement about the water heater manufacturer's insulation thickness requirements is necessary because energy compliance listing for the water heater could require that the inlet and outlet piping be insulated with a thickness greater than ½ inch. And this section should not apply to tankless water heaters as they do not have storage that leads to standby heat losses.

C404.5.3
This section covers the insulation requirements for all other heated water piping that isn't addressed in the two preceding sections. The table of insulation thicknesses mirrors what is required by ASHRAE 90.1-2007 except an entry was added for 3/8 inch pipe or tubing. Some people would like to have the insulation thickness be 1 inch for all piping for "simplicity". But what they fail to realize is that such a requirement would make the installation of smaller piping near or at the ends (outlets) of the system very difficult to accomplish. For example, imagine trying to install ½ inch copper (or PEX) tubing (now 2 5/8 inch diameter with the required insulation) in a 3 ½ inch deep wall cavity with other piping crossing over. Or making that large diameter pass through wood or light frame steel members for a 3 ½ inch deep wall cavity. While ½ inch insulation thickness on ½ inch tubing is still a challenge to install, it is easier. Ideally, many fixtures could be installed using 3/8 inch tubing (only about 1 ¼ inch diameter with the required insulation) inside 3 ½ inch wall cavities. Let's be reasonable and in touch with how buildings are constructed.

Part II – IPC

Section 607.5 did not read exactly the same way as the IECC section (C404.5) that drives this section although the intent was the same. The proposal changes Section 607.5 makes the section read exactly the same way as proposed changes to C404.5. Also, because the IPC covers plumbing for Group R2, R3, R4 occupancies that are 3 stories or less above grade plane, Section 607.5 must have a statement to *exclude* those occupancies because there are different IECC requirements (the Residential provisions of IECC) for those occupancies.

Cost impact: None

C404.5-EC-KLEIN

Committee Action Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The existing section language is much simpler. There is no justification for adding such a complex set of rules for insulating piping.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C404.5 Insulation of piping. Piping ~~to the inlet of a water heater and piping~~ ~~conveying water heated by~~ from a water heater to the termination of the heated water fixture supply pipe shall be insulated in accordance with Table C403.2.8. On both the inlet and outlet piping of a storage water heater or heated water storage tank, the piping to a heat trap or the first 8 feet (2438 mm) of piping, whichever is less, shall be insulated. Piping that is heat traced shall be insulated in accordance with Table C403.2.8 or the heat trace manufacturer's instructions. ~~Sections C404.5.1, C404.5.2 and C404.5.2.3. Where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be not greater than 0.28 Btu per inch/h•ft2 • F [0.40 W/(m•K)] for water temperatures less than or equal to 140°F (60°C) and not greater than 0.29 Btu per inch/h•ft2 • F [0.42 W/(m•K)] for water temperatures greater than 140°F (60°C) and less than or equal to 200°F (93.3°C).~~ Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. ~~This section shall not be construed as requiring insulation on the following:~~

Exception: Tubular pipe insulation shall not be required on the following:

1. The tubing from the connection at the termination of the fixture supply piping to a plumbing fixture or plumbing appliance ~~fixture fitting or a water consuming appliance~~.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch or less in nominal diameter
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping surrounded by building insulation with a thermal resistance (R-value) of not less than R-3.

~~**C404.5.1 Circulating system piping and heat-traced piping.** Heated water circulation system piping shall be insulated in accordance with Table C404.5.1. Piping that is heat-traced to maintain heated water temperature shall be insulated in accordance with Table C404.5.1 or shall have insulation thickness in accordance with the heat tracing manufacturer's requirements. Untraced piping within a heat-traced system shall be insulated in accordance with Table C404.5.1.~~

~~TABLE C404.5.1~~
~~MINIMUM TUBULAR PIPE INSULATION WALL THICKNESS~~

~~NOMINAL PIPE OR TUBE DIAMETER (inches)~~	~~MINIMUM INSULATION WALL THICKNESS (inches)~~	
	~~≤140 °F WATER TEMPERATURE~~	~~>140 °F to 200°F WATER TEMPERATURE~~
~~≤3/8~~	~~3/8~~	~~3/8~~
~~> 3/8 to <3/4~~	~~1/2~~	~~1/2~~
~~≥ 3/4 to <1~~	~~3/4~~	~~1~~
~~≥1 to <1 1/2~~	~~1~~	~~1 1/2~~
~~≥1 ½ to <4~~	~~1 1/2~~	~~2~~
~~≥4 to <8~~	~~1 1/2~~	~~2~~
~~≥8~~	~~1 1/2~~	~~2~~

~~For SI: 1 inch = 25.4 mm, °C= [(°F – 32)/1.8]~~

~~**C404.5.2 Inlet piping connecting to water heaters and storage tanks.** Where a water heater or a heated water storage tank is not equipped with integral heat traps, the inlet piping within 8 feet (2438 mm) of piping length of the water heater or storage tank shall be insulated in accordance with Table C404.5.1. This requirement shall not supersede the water heater manufacturer's requirements for a greater insulation thickness on the inlet piping.~~

~~**Exceptions:**~~

1. ~~Inlet piping or tubing to a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.~~
2. ~~Valves, pumps, strainers and threaded unions in water heater or heated water storage inlet piping that is 1 inch (25.4 mm) nominal diameter or less shall not be required to be insulated.~~

~~**C404.5.3 Other heated water piping.** Piping conveying heated water that is not addressed by Sections C404.5.1 and C404.5.2 shall have insulation with a wall thickness of not less than that indicated in Table C404.5.1.~~

~~**Exceptions:**~~

1. ~~Outlet piping or tubing from a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.~~
2. ~~Piping or tubing that is completely surrounded by not less than 1 inch (25.4 mm) thickness of building thermal envelope insulation in walls, attics and crawl spaces shall not be required to be insulated with tubular pipe insulation provided that the piping or tubing is 1 inch (25.4 mm) nominal diameter or smaller.~~

Reason: Hot water supply piping should be insulated from the source of heated water to the termination of the fixture supply pipe for plumbing fixtures and plumbing appliances. The existing code text, while simple, is incomplete, covering only a portion of some systems.

We attempted to have these changes heard at the development hearing, but the floor modification was not accepted for discussion.

The key features are: reference to existing insulation provisions in the IECC-Commercial chapter that specify the wall thickness of pipe insulation for different diameter piping; clarifying that insulation does not need to be continuous when it passes through framing members; providing a list of exemptions specific to heated water piping and clarifying the insulation on the inlet and outlet piping to storage tanks.

We urge your support of this code change.

CE271-13, Part I

Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE271-13, PART II-IPC

Revise as follows:

[E] 607.5 ~~Pipe~~ Insulation of piping. ~~Hot water piping in automatic temperature maintenance systems shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K). The first 8 feet (2438 mm) of hot water piping from a hot water-source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K).~~ For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5 through C404.5.3 of the *International Energy Conservation Code*. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Section R403.4.2 of the *International Energy Conservation Code*.

Reason: This section has generated a lot of questions over the many years since it was put into the IECC. Some people believe that this section requires all hot water piping to have 1 inch insulation. Others believe that this section only requires that hot water circulating system piping (or heat traced piping) have 1 inch of insulation. Another question that arises is what is meant by "hot water" as there is not a definition of such in the IECC. Other questions that arise are "Is the insulation required to be continuous along the piping?" and "Should really small piping and tubing be insulated?" The exception really isn't an exception but requirements for heat-traced systems.

There is no other place in the Commercial Provisions of the IECC that covers the insulation of Service Water Heating piping. This subject is important! In summary, the language in this section is a mess and the words do not clearly state the intended requirements. Let's stop dancing around this important aspect of lessening energy consumption.

The proposed revisions and why:

C404.5
The intent of the struck-out language can be found in new sections C404.5.1 and C404.5.2. The new language for this struck language is discussed later in this reason statement.

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. But what about tempered water (IPC definition of 85F to 110F)? Keep in mind that ASHRAE 90.1-2007 only requires insulation of service water piping conveying water of 105F of greater. It doesn't seem reasonable to say only "hot water" (as defined by the IPC). If necessary, the committee could request a public comment to amend this section to indicate that the section only covers water 105F and greater.

The statement about protection of personnel from external insulation temperatures and freezing conditions is really common sense but it is added for clarity. It also serves as a reminder for the designer to consider these important issues.

The language "The insulation shall be continuous along the piping." was added to answer the obvious and most often asked question. But keep in mind that this requirement could have serious structural implications when piping is routed through light frame construction members (wood studs and joist, metal studs and solid web joists). The holes to accommodate the piping diameter and insulation could become quite large and in some cases, making piping installation very difficult to perform unless soffits and chases are added and wall thicknesses are increased. Again, the committee could express its opinion on this issue by requesting that a public comment for *not* having insulation be continuous through wood studs and joist/metal studs and solid web joists. Either way, this question needs to be answered in a definitive manner.

The list of items where pipe insulation is not required is almost common sense but still, these items need to be stated to avoid confusion and possible misinterpretations by the code officials. Insulating valves is time consuming and if the right type of valve is not used, insulating is almost impossible (think ball valve without a raised handle). A few uninsulated valves in the system are not going to lose a lot of heat. Pumps are also difficult to insulate and in some cases, insulation might cause overheating of the pump motor. Threaded unions usually only occur in smaller diameter piping systems and are time consuming to insulate. Again, a small amount of heat loss compared to the entire system. Piping or tubing from a small tankless water heater serving one sink is too small to easily insulate. The heat loss is negligible.

C404.5.1
The first sentence of this section is saying exactly what the first struck out sentence in C404.5 says. The second sentence picks up the intent of the requirement in the first sentence of the struck out exception.

C404.5.2
The first sentence picks up the intent of the second sentence of struck-out language in C404.5. If a water heater (or heated water storage tank) does not have integral heat traps, there will be standby heat losses from convection of the heated water into the water inlet and outlet piping of the storage water heater or heated water storage tank. Insulating the inlet and outlet piping for 8 feet mitigates this heat loss. But it is not necessary to include the outlet piping in this section because new Section C404.5.3 requires insulating all other piping (which would include the heater or storage tank outlet piping). If the water (or heated water storage tank) serves a circulating system, then there is no convection of heat water into the piping connected to the heater and storage tank--the water is circulating and Section C404.5.1 takes care of the insulating requirement.

The statement about the water heater manufacturer's insulation thickness requirements is necessary because energy compliance listing for the water heater could require that the inlet and outlet piping be insulated with a thickness greater than ½ inch. And this section should not apply to tankless water heaters as they do not have storage that leads to standby heat losses.

C404.5.3
This section covers the insulation requirements for all other heated water piping that isn't addressed in the two preceding sections. The table of insulation thicknesses mirrors what is required by ASHRAE 90.1-2007 except an entry was added for 3/8 inch pipe or tubing. Some people would like to have the insulation thickness be 1 inch for all piping for "simplicity". But what they fail to realize is that such a requirement would make the installation of smaller piping near or at the ends (outlets) of the system very difficult to accomplish. For example, imagine trying to install ½ inch copper (or PEX) tubing (now 2 5/8 inch diameter with the required insulation) in a 3 ½ inch deep wall cavity with other piping crossing over. Or making that large diameter pass through wood or light frame steel members for a 3 ½ inch deep wall cavity. While ½ inch insulation thickness on ½ inch tubing is still a challenge to install, it is easier. Ideally, many fixtures could be installed using 3/8 inch tubing (only about 1 ¼ inch diameter with the required insulation) inside 3 ½ inch wall cavities. Let's be reasonable and in touch with how buildings are constructed.

Part II – IPC
Section 607.5 did not read exactly the same way as the IECC section (C404.5) that drives this section although the intent was the same. The proposal changes Section 607.5 makes the section read exactly the same way as proposed changes to C404.5. Also, because the IPC covers plumbing for Group R2, R3, R4 occupancies that are 3 stories or less above grade plane,

Section 607.5 must have a statement to *exclude* those occupancies because there are different IECC requirements (the Residential provisions of IECC) for those occupancies.

Cost impact: None

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: **Disapproved**

Committee Reason: The proposed new wording adds confusion and complexity to the code. There doesn't seem to be any payback for such complexity.

Assembly Action: **None**

CE274-13

C202 (New), C404.5 (New), C404.5.1 (New), C404.5.1 (New), Table C404.5.1 (New), C404.5.2 (New), C404.5.2.1 (New)

Proposed Change as Submitted

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

Add new text as follows:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

C404.5.1 Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe for *plumbing fixtures* and *plumbing appliances* shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		WATER FROM A WATER HEATER	WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE
1/4	0.33	50	50
5/16	0.5	50	48
3/8	0.75	50	32
1/2	1.5	43	16
5/8	2	32	12
3/4	3	21	8
7/8	4	16	6
1	5	13	5
1 ¼	8	8	3
1 ½	11	6	2
2 or larger	18	4	1

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or *plumbing appliance* shall be 0.5 gallon (1.89 L) where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Reason: This change speeds hot water to the user, saves energy and water, and potentially lowers construction costs. All these are accomplished by limiting the volume of water in the pipes.

We have all have turned on the hot water and waited for it to get hot. While we wait water runs down the drain, wasting clean water. While we wait, our time is wasted. When we are done there is still hot water in the pipes, water which cools thereby wasting as much energy as it took to heat the water in the pipes. Pipes with larger volumes take longer to fill, waste more and are potentially more expensive to build.

This proposal remedies the problems above by reducing the water volume between the source of heated water and the use. The first method (Section R403.4.2.1) requires no calculation; it limits the water volume in the pipes by limiting the pipe length. The second option (Section R403.4.2.1) requires a calculation of volume in the pipes, but provides a table that translates the pipe length into a volume (columns 1 and 2); and provides quick options for different pipe assumptions in columns 3 and 4.

In simple form, cutting the volume in half: cuts the wait time in half, cuts the clean water wasted down the drain in half, cuts the energy loss while water goes through the pipes in half, and cuts the loss of energy from hot water left in the pipes after use in half.

Why is the maximum volumes 0.5 gallon when the source of heated water is a water heater? So that following standard practice for plumbing engineers and meeting the minimum requirements in the energy code will be aligned. At present, they are not, with the result that hot water delivery times are greater than 30 seconds after the tap is opened; unacceptable performance according to the American Society of Plumbing Engineers.

The American Society of Plumbing Engineers (ASPE) provides plumbing engineers with the guidance for hot water distribution system design as shown in Figure 1. I believe that the minimum energy code should have at least marginal performance at typical actual flow rates. These actual flow rates generally range from 1-2 gpm for private lavatory faucets, showerheads, dishwashers and washing machines. This is true even though faucets are allowed to be 2.2 gpm @ 60 psi and showerheads 2.5 gpm @80 psi. The reason for actual flow rates being lower than rated flow rates is due to the fact that the pressure in the building is often less than the rated pressure. With fixed orifice aerators, common in minimally legal faucets and showerheads, the flow rate drops off rather rapidly as the pressure decreases.

It makes sense to me that the minimum code should provide for at least marginal performance in buildings that are supplied with low pressure. This means that we need to be sure that the time-to-tap is still reasonable even when flow rates are at the lower end of the typical range; that is close to 1 gpm. According to ASPE, marginal performance would mean that hot water needs to arrive in no longer than 30 seconds after the tap is opened. Figure 2 shows that this will be true when the volume of water between the source and the use does not exceed 0.5 gallon.

Figure 1 ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Figure 2 Converting Flow Rate and Pipe Volume to Time-to-Tap

Volume in the Pipe		**Minimum Time-to-Tap (seconds) at Selected Flow Rates**					
Gallons	**Ounces**	**0.25 gpm**	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
0.02	**2**	4	1.9	0.9	0.6	0.5	0.4
0.03	**4**	8	4	1.9	1.3	0.9	0.8
0.06	**8**	15	8	4	2.5	1.9	1.5
0.13	**16**	30	15	8	5	4	3
0.19	**24**	45	23	11	8	6	5
0.25	**32**	60	30	15	10	8	6
0.50	**64**	120	60	30	20	15	12
1.00	**128**	240	120	60	40	30	24

Why is the maximum volume 0.19 gallon when the source of heated water is a circulation loop or heat-traced pipe? In exchange for the flexibility in the location of the water heater relative to the plumbing fixtures and plumbing appliances, the allowable volume that will be wasted has been reduced and the time-to-tap improved so that it will almost always fall into ASPE's range for Acceptable Performance.

The definition proposed is used in both the IPC and the IRC.

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: There are several ways to meet the requirements of this proposal, many of which cost less than current piping practices. I would recommend that builders and developers select one of the less expensive methods.

C404.5 #2 (New)-EC-KLEIN

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: There needs to be a better cost analysis to justify this complexity in piping design. The lengths seem to be too short for the recirculation loop column.

Assembly Action: Approved as Submitted

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted and Public Comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		~~WATER FROM A WATER HEATER~~	~~WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE~~
1/4	0.33	50	~~50~~
5/16	0.5	50	~~48~~
3/8	0.75	50	~~32~~
1/2	1.5	43	~~16~~
5/8	2	32	~~12~~
3/4	3	21	~~8~~
7/8	4	16	~~6~~
1	5	13	~~5~~
1 ¼	8	8	~~3~~
1 ½	11	6	~~2~~
2 or larger	18	4	~~1~~

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or *plumbing appliance* shall be 0.5 gallon (1.89 L). ~~where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.~~ Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water.

Commenter's Reason: At this time hot water distribution systems in commercial buildings are required to limit the length between the source of hot water and the plumbing fixtures and plumbing appliances to 50 feet of developed length in accordance with provisions in the IPC.

However, meeting the maximum length provision does not ensure that hot water will arrive at fixtures in a timely manner. It also wastes energy. It also means that plumbing engineers cannot meet their standards of practice.

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. We have all experienced the problem of waiting for hot water to arrive at plumbing fixtures. Installing the hot water piping so that the delivery is more efficient will stay with the building for 50-100 years. Similarly the pain of an inefficient system will last just as long.

This proposal brings the length limitation from the IPC into the IECC. Simplifying the original proposal further, there is now only one maximum length column. The length (and the volume) from all sources of heated water to any plumbing fixture or appliance will be the same.

Supporting this proposal will result in correlating the IECC with the marginal performance standards of practice for plumbing engineers (See the orange row in Figure 1).

Figure 1. ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Most plumbing fixtures operate from 1 – 2.5 gpm. Figure 2 shows that the volume in the piping will be a maximum of 64 ounces for plumbing fixtures with these flow rates. As can be seen, the same volume in the piping results in improved performance when the flow rates are at the higher end of the range.

Figure 2 Comparing Pipe Volume, Plumbing Fixture Flow Rate and the Time-to-Tap

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

I urge your support.

Public Comment 2:

Ryan Meres, Institute for Market Transformation, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows

C404.5 Efficient heated water supply piping. From the nearest source of heated water to a plumbing fixture or plumbing appliance, the developed length shall not exceed 50 feet (15240 mm), or the time for heated water to arrive shall not exceed 30 seconds when the fixture or appliance is turned on to full hot, whichever is less. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water. ~~Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through 1/4 inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).~~

~~**C404.5.1 Maximum allowable pipe length method**. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe for *plumbing fixtures* and *plumbing appliances* shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.~~

~~TABLE C404.5.1~~
~~PIPING VOLUME AND MAXIMUM PIPING LENGTHS~~

~~NOMINAL PIPE SIZE (inch)~~	~~VOLUME (liquid ounces per foot length)~~	~~MAXIMUM PIPING LENGTH (feet)~~	
		~~WATER FROM A WATER HEATER~~	~~WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE~~
~~1/4~~	~~0.33~~	~~50~~	~~50~~
~~5/16~~	~~0.5~~	~~50~~	~~48~~
~~3/8~~	~~0.75~~	~~50~~	~~32~~
~~1/2~~	~~1.5~~	~~43~~	~~16~~
~~5/8~~	~~2~~	~~32~~	~~12~~
~~3/4~~	~~3~~	~~21~~	~~8~~
~~7/8~~	~~4~~	~~16~~	~~6~~
~~1~~	~~5~~	~~13~~	~~5~~
~~1 ¼~~	~~8~~	~~8~~	~~3~~
~~1 ½~~	~~11~~	~~6~~	~~2~~
~~2 or larger~~	~~18~~	~~4~~	~~1~~

~~1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L~~

~~C404.5.2 Maximum allowable pipe volume method~~. ~~The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a~~ ~~*plumbing fixture*~~ ~~or~~ ~~*plumbing appliance*~~ ~~shall be 0.5 gallon (1.89 L) where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.~~

~~C404.5.2.1 Water volume determination~~. ~~The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.~~

Commenter's Reason: At this time hot water distribution systems in commercial buildings are required to limit the length between the source of hot water and the plumbing fixtures and plumbing appliances to 50 feet of developed length in accordance with provisions in the IPC.

However, meeting the maximum length provision does not ensure that hot water will arrive at fixtures in a timely manner. It also wastes energy. It also means that plumbing engineers cannot meet their standards of practice.

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. We have all experienced the problem of waiting for hot water to arrive at plumbing fixtures. Installing the hot water piping so that the delivery is more efficient will stay with the building for 50-100 years. Similarly the pain of an inefficient system will last just as long.

This proposal brings the length limitation from the IPC into the IECC. It adds the provision that the hot water supply shall deliver hot water within 30 seconds after the plumbing fixture has been turned on. This provision is in line with the marginal performance standards of practice for plumbing engineers (See the orange row in Figure 1).

Figure 1. ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Most plumbing fixtures operate from 1 – 2.5 gpm. Figure 2 shows that the volume in the piping will be a <u>maximum</u> of 64 ounces for plumbing fixtures with these flow rates. When flow rates are lower, the volume needs to be smaller.

Figure 2 Comparing Pipe Volume, Plumbing Fixture Flow Rate and the Time-to-Tap

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

The changes in this comment simplify the proposal by reducing the perceived complexity of having a table and also by making the requirements the same for all sources of hot water.

I urge your support.

CE274-13

Final Action: AS AM AMPC____ D

CE275-13

C202 (NEW), C404.5 (NEW), C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.2.1 (NEW)

Proposed Change as Submitted

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

Add new text as follows:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

C404.5.1 Maximum allowable pipe length method. The maximum piping length from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)
		LAVATORY FAUCETS—PUBLIC
1/4	0.33	6
5/16	0.5	4
3/8	0.75	3
1/2	1.5	2
5/8	2	1
3/4	3	0.5
7/8	4	0.5
1	5	0.5
1 ¼	8	0.5
1 ½	11	0.5
2 or larger	18	0.5

For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The maximum piping volume from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be 2 ounces (0.06 L). The water volume in the piping shall be calculated in accordance with Section C404.5.2.1.

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Reason: The problem of heated water taking an excessively long time to arrive at lavatory faucets in public restrooms is well known. The length of time the faucets are used during each hand washing event is very short, often around 5 seconds. Federal law requires low flow rate or small, metered volumes for the faucets in these applications. Health codes expect heated water for washing hands in these applications. The dilemma is that the volume of not-hot water in the piping from the source of hot water to the faucets is much too large for the heated water to arrive in a timely fashion; even at the 50-foot limit currently required in the 2012 IPC.

Supporting this proposal will correlate the IECC with Federal law and local health codes by providing heated water for hand washing in a timely matter.

The delivery of hot water to public lavatory faucets needs to be considered separately because of potential health issues. The events are short and the flow rates are low. Table 1 shows the time-to-tap performance based on the requirements in the proposal. The 0.25 and 0.5 gpm columns are typical of the flow rates for public lavatory faucets. The volume in the pipe was chosen so that heated water would arrive in the first part of the hot water event so that every person who uses the public lavatory will have the benefits of hot water.

Table 1 Time-to-Tap Performance when the Volume in the Piping from the Source to the Use is 2 ounces

Volume in the Pipe (ounces)	**~~Minimum~~ Time-to-Tap (seconds) at Selected Flow Rates**					
	0.25 gpm	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
2	3.8	1.9	0.9	0.6	0.5	0.4

The energy savings comes from not losing the heat from the water as it tries to arrive at the faucets.
For more information and background on issues related to hot water distribution please read the 4-part series at: http://www.allianceforwaterefficiency.org/Residential_Hot_Water_Distribution_System_Introduction.aspx
Cost impact: There are several ways to meet the requirements of this proposal, some of which cost less than current heated water system practices. I would recommend that builders and developers select one of the less expensive methods.

C404.5 #3 (NEW)-EC-KLEIN

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee couldn't grasp the energy savings issue of the proposal. This seems to be more of a comfort issue that is really not the concern of the IECC.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action and public comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Reason: This proposal focuses on the delivery of heated water to <u>public lavatory faucets,</u> a problem all of us are familiar with.

While comfort is important to the user, current plumbing practice results in a significant waste of energy, without actually providing the intended or code required (health) service. The waste occurs when the water in the branches and fixture supplies cools down between the intermittent uses that occur in public bathrooms. Making the volume between the source of hot water

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. Installing the hot water piping so that the delivery is more efficient will stay with the building for 50-100 years. Similarly the pain of an inefficient system will last just as long.

I urge your support.

Public Comment 2:

Ryan Meres, Institute for Market Transformation, representing self, requests Approval as Modified by this Public Comment.

C404.5 Efficient heated water supply piping. <u>From the nearest source of heated water to a public lavatory faucet, the time for heated water to arrive shall not exceed 5 seconds when the faucet is turned on to full hot, or for hands-free faucets, with the mixing valve set to the specified outlet temperature. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water.</u> ~~Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through 1/4 inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).~~

~~**C404.5.1 Maximum allowable pipe length method**. The maximum piping length from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.~~

~~**TABLE C404.5.1**~~
~~**PIPING VOLUME AND MAXIMUM PIPING LENGTHS**~~

~~**NOMINAL PIPE SIZE (inch)**~~	~~**VOLUME (liquid ounces per foot length)**~~	~~**MAXIMUM PIPING LENGTH (feet)**~~
		~~**LAVATORY FAUCETS—PUBLIC**~~
~~1/4~~	~~0.33~~	~~6~~
~~5/16~~	~~0.5~~	~~4~~
~~3/8~~	~~0.75~~	~~3~~
~~1/2~~	~~1.5~~	~~2~~
~~5/8~~	~~2~~	~~1~~
~~3/4~~	~~3~~	~~0.5~~
~~7/8~~	~~4~~	~~0.5~~
~~1~~	~~5~~	~~0.5~~
~~1 ¼~~	~~8~~	~~0.5~~
~~1 ½~~	~~11~~	~~0.5~~
~~2 or larger~~	~~18~~	~~0.5~~

~~For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L~~

~~**C404.5.2 Maximum allowable pipe volume method**. The maximum piping volume from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be 2 ounces (0.06 L). The water volume in the piping shall be calculated in accordance with Section C404.5.2.1.~~

~~**C404.5.2.1 Water volume determination**. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where~~

~~heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.~~

Commenter's Reason: This proposal focuses on the delivery of heated water to public lavatory faucets a problem all of us are familiar with.

While comfort is important to the user, current plumbing practice results in a significant waste of energy, without actually providing the intended or code required (health) service. The waste occurs when the water in the branches and fixture supplies cools down between the intermittent uses that occur in public bathrooms.

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. Installing the hot water piping so that the delivery is more efficient will stay with the building for 50-100 years. Similarly the pain of an inefficient system will last just as long.

This comment simplifies the original proposal by saying that the hot water supply piping shall deliver hot water within 5 seconds after the public lavatory faucet has been turned on. This time limit is important because the actual amount of time a public lavatory faucet is used is generally less than 10 seconds. It only makes sense to have a code that delivers hot water in the first portion of the short event. This revised code section is now in line with the acceptable performance standards of practice for plumbing engineers (See the green row in Figure 1).

Figure 1. ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Public lavatory faucets are a special case in the code as their flow rate is generally 0.5 gpm or less. However, since most public lavatory faucets are hands-free, the hot water portion of the mix is closer to 0.25 gpm. Figure 2 shows that the volume in the piping needs to be small for the heated water to arrive quickly at the faucets.

Figure 2 Comparing Pipe Volume, Plumbing Fixture Flow Rate and the Time-to-Tap

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

The changes in this comment simplify the proposal by reducing the complexity of having a table.

I urge your support.

CE275-13

Final Action: AS AM AMPC____ D

CE277-13, Part II
C404.5.1 (New), R403.3 (New) (N1103.3 (New))

PART I OF THIS CODE CHANGE WAS WITHDRAWN BY PROPONENT

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Howard Ahern representing Airex Mfg. (howard.ahern@airexmfg.com)

PART II IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.3 (N1103.3) Water heater piping insulation protection. Exposed water piping that is insulated and that is connected to a water heater shall have the insulation protected from damage by a removable and reusable covering. The covering shall extend for not less than 5 feet (1524 mm) from the water heater. The covering shall not be adhesive tape.

Reason. This code change is needed to insure integrity of the water heater piping insulation. Pipe insulation is often silt open to install over water heating piping, the slits often stay open or adhesive used to glue slit close degrade and slits open wasting energy and money. Removable and reusable covering will insure pipe insulation slits are closed to save energy. This change will ensures steady, long-term thermal performance and maintain system integrity, sustainability, of the insulation saving energy.
Water Heating equipment require periodic maintenance. The frequency varies with how hard the unit operates, exterior temperature, preventive maintenance program, and many others. In every occasion, maintenance provides an excuse for the piping insulation to be touched and or removed. Pipe insulation removal often results in damage to the insulation itself requiring replacement. Protection for piping insulation therefore needs to be removable and reusable. This will help insure system integrity and sustainability of the pipe insulation, reducing replacement.

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

C404.5.1 (NEW)-EC-AHERN.DOC

Committee Action Hearing Results

Errata for this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: This requirement would be too difficult to enforce.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Howard Ahern, Airex Mfg. representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.4.3 (N1103.3) Outdoor water heater piping insulation protection. ~~Exposed~~ Insulated water piping ~~that is insulated and~~ that is connected to a water heater and that is exposed to the outdoors shall have the insulation protected from damage by a removable and reusable covering. The covering shall extend for not less than 5 feet (1524 mm) from the water heater. The covering shall not be adhesive tape

Commenter's Reason: This code change is needed to insure integrity of the water heater piping insulation that is exposed to weather. This change will ensures steady, long-term thermal performance and maintain system integrity, sustainability, of the insulation saving energy.

Water heating equipment requires periodic maintenance. Pipe insulation is often silt open to install over water heating piping, the slits often stay open or adhesive used to glue slit close degrade and slits open wasting energy and money. Removable and reusable covering will insure pipe insulation slits are closed to save energy. The frequency varies with how hard the unit operates, exterior temperature, preventive maintenance program, and many others. In every occasion, maintenance provides an excuse for the piping insulation to be touched and or removed. Pipe insulation removal often results in damage to the insulation itself requiring replacement.

Protection for piping insulation therefore needs to be removable and reusable.

CE277-13, Part II

Final Action: AS AM AMPC____ D

CE278-13, Part I

C404.6, C404.7 (NEW), IPC [E] 607.2.1, IPC [E] 607.2.1.1 (NEW)

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED ONLY FOR INFORMATION PURPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 Hot water temperature maintenance system controls. For hot water distribution system circulating ~~hot water~~ ~~system~~ pumps ~~or~~ and heat trace, the pumps and heat trace shall be arranged to be turned off ~~either~~ automatically ~~or manually~~ when there is ~~limited~~ not hot water demand. Operating controls shall be *readily accessible* .

C404.7.1 Storage tank hot water circulation systems. Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the criteria of the IECC Commercial Provisions, has a provision to circulating system pump controls. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

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

C404.6-EC-FERGUSON.DOC

Committee Action Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The language of the proposal is too specific such that it would restrict new technologies.

Assembly Action: Approved as Modified

Modify the proposal as follows:

~~**C404.7.1 Storage tank hot water circulation systems.** Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.~~

C404.6.1 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action and a Public Comment was received.

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by Assembly Floor Action as Published in the ROH.

Commenter's Reason: The purpose of this Public Comment is to support the Assembly Action, which was to Approve the proposal As Modified. This Assembly Action will correlate the language on this topic in the IECC and the IPC.

I am asking you to support the Assembly Action because of a misunderstanding that occurred during the development hearing in which my comments were taken by the Committee to be in opposition rather than in support. The Committee understood the misunderstanding when it considered CE278-13, Part II and approved that proposal as modified, but it was too late to correct the decision on Part I.

Thank you for your consideration in supporting this Assembly Action.

CE278-13, Part I

Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE278-13, PART II–IPC

Revise as follows:

[E] 607.2.1 Hot water temperature maintenance system controls. ~~Automatic~~ For hot water distribution system circulating ~~hot water~~ ~~system~~ pumps ~~or~~ and heat trace, the pumps and heat trace shall be arranged to be ~~conveniently~~ turned off ~~either~~ automatically ~~or manually~~ when there ~~hot water system~~ ~~is not in operation~~. is ~~limited~~ not hot water demand. *Ready access* shall be provided to the operating controls. This section and Section 607.2.1.1 shall not apply to hot water temperature maintenance system controls in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Hot water temperature maintenance system controls in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section R403.4.1 of the *International Energy Conservation Code.*

[E] 607.2.1.1 Storage tank hot water circulation systems. Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the criteria of the IECC Commercial Provisions, has a provision to circulating system pump controls. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

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

PART II – IPC
Committee Action: **Approved as Modified**

Modify the proposal as follows:

~~**[E] 607.2.1.1 Storage tank hot water circulation systems.** Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.~~

[E] 607.2.1.1 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

Committee Reason: The modification was made to address concerns about what pumps are being discussed. The overall proposal was approved because The *International Plumbing Code* needs to make the correct references to sections in the IECC.

Assembly Action: **None**

CE279-13, Part I

C404.6, C404.6.1 (NEW), C404.6.2 (NEW), Chapter 5, IPC [E]607.2.1, IPC [E]607.2.1.1 (NEW), IPC [E]607.2.1.1.1 (NEW), IPC [E]607.2.1.1.2 (NEW), IPC Chapter 14

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I-IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 ~~Circulating~~ ~~hot~~ Heated water circulating and temperature maintenance systems ~~controls~~ (Mandatory). ~~Circulating hot water systems shall be provided with an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in~~ use Heated water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Automatic controls, temperature sensors and pumps shall be *accessible*. Manual controls shall be *readily accessible*.

C404.6.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

C404.6.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standard to Chapter 5 as follows:

IEEE The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

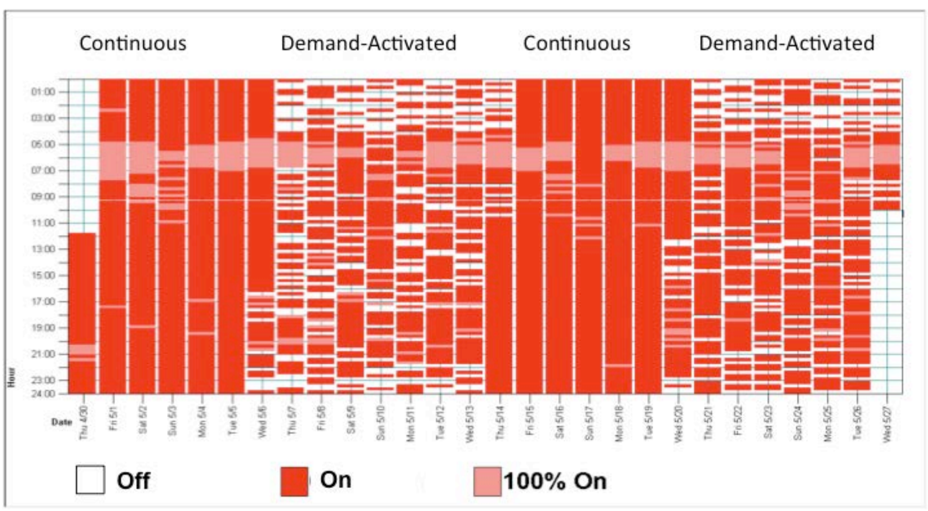
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	**Br**	**T-Br**
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

C404.6-EC-KLEIN

Committee Action Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal has too many holes and would create problems with heat trace manufacturers that already list and label their products to UL 515.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C404.6 Heated water circulating and temperature maintenance systems ~~(Mandatory).~~ Heated water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Automatic controls, temperature sensors and pumps shall be *accessible*. Manual controls shall be *readily accessible*.

C404.6.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. ~~Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~ Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

Reason: The purpose of this proposal is to clarify the requirements for heated water circulation systems and for heat trace systems, <u>if they are installed</u>. The proposed changes do not require the use of circulation or heat trace.

At the development hearing we were unable to hear a floor modification that would have resolved the Committee's concerns. The modifications shown in this comment remove the holes. The IECC-RE development Committee was able to hear these modifications and approved RE125 as modified by the committee. Those provisions are incorporated into this comment.

Supporting this modification will correlate the language in the Commercial and Residential chapters of the IECC. Circulating systems and heat trace cannot tell what occupancy they have been installed in and the energy efficiency issues are similar enough that the provisions should be the same for all occupancies.

I urge your support.

CE279-13, Part I

Final Action: AS AM AMPC____ D

CE279-13, Part II

C404.6, C404.6.1 (NEW), C404.6.2 (NEW), Chapter 5, IPC [E]607.2.1, IPC [E]607.2.1.1 (NEW), IPC [E]607.2.1.1.1 (NEW), IPC [E]607.2.1.1.2 (NEW), IPC Chapter 14

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II-IPC

Revise as follows:

[E] 607.2.1 ~~Hot~~ Heated water circulation and temperature maintenance systems ~~controls~~. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, ~~automatic~~ circulating hot water systems ~~pumps or heat trace~~ shall be ~~arranged to be~~ provided with a ~~conveniently turned off, automatically or~~ manual~~ly~~ switch having ready access or an automatic switch~~,~~ that can turn off ~~when~~ the hot water circulating pump when the system is not in use ~~operation~~. Heated water circulation and temperature maintenance systems for other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.

[E] 607.2.1.1 For other than Group R2, R3 and R4 occupancies 3 stories or less. This section shall apply to other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. *Access* to automatic controls, temperature sensors and pumps shall be provided. *Ready access* to manual controls shall be provided.

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standard to Chapter 14 as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

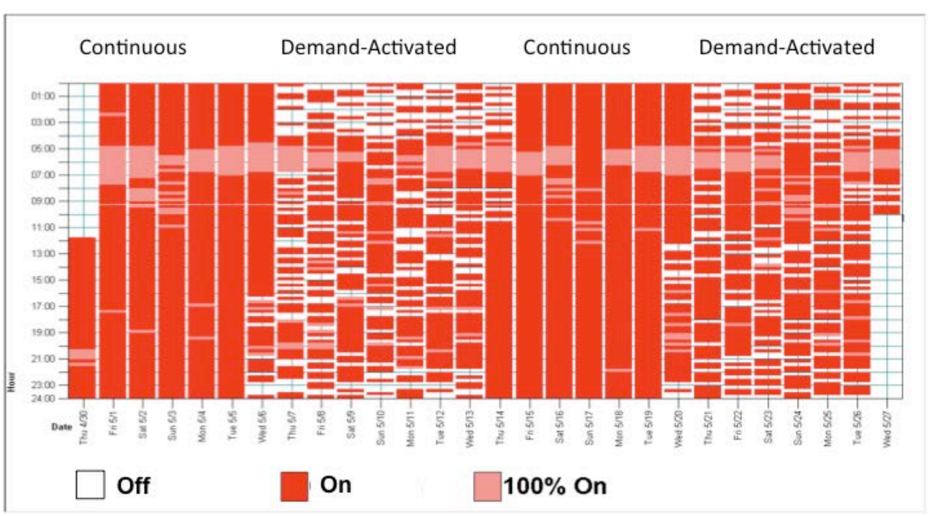
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

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Heat Trace			
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	Trunk	**Br**	**T-Br**
Supply Heat Losses			
High Temp	394	552	946
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Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

C404.6-EC-KLEIN

Committee Action Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: Disapproved

Committee Reason: The proposal has too many holes and would create problems with heat trace manufacturers that already list and label their products to UL 515.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[E] 607.2.1 Heated water circulating and heat trace ~~temperature maintenance~~ systems. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, heated water circulation and heat trace systems shall be installed in accordance with Section R403.4.2 of the *International Energy Conservation Code*. For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, controls for heated water circulation and heat trace systems shall be installed in accordance with Sections C404.6 of the *International Energy Conservation Code*.
~~circulating hot water systems shall be arranged to be provided with a manual switch having ready access, or an automatic switch, that can turn off the hot water circulating pump when the system is not in use. Heated water circulation and temperature maintenance systems for other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.~~

~~**[E] 607.2.1.1 For other than Group R2, R3 and R4 occupancies 3 stories or less**. This section shall apply to other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. *Access* to automatic controls, temperature sensors and pumps shall be provided. *Ready access* to manual controls shall be provided.~~

~~**[E] 607.2.1.1 Circulation systems**. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~

~~**[E] 607.2.1.2 Heat trace systems.** Electric heat trace systems shall comply with IEEE 515.1 2012. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.~~

~~**Add standards to Chapter 14 as follows:**~~

~~**IEEE**~~
~~515.1 2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications~~

Commenter's Reason: The purpose of this proposal is to clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

At the development hearing we were unable to hear a floor modification that would have resolved the Committee's concerns.

The requirements for efficient heated water circulation and electrical heat trace systems belong in the IECC. However, it is important for those implementing the IPC to know what is required of them when installing these systems. These systems affect the design and layout of the overall domestic piping supply, and need to carry a reference to avoid lapses in coordination with other requirements of the system controls.

In order to decrease the possibility of conflicting language appearing in the two documents, it makes sense to have the provisions in the IECC and the pointer in the IPC. This greatly simplifies the code language.

Supporting this modification will correlate the language in the IPC with that in the IECC.

I urge your support.

CE279-13, Part II

Final Action: AS AM AMPC____ D

CE280-13, Part I

C404.6, C404.6.1 (New), C404.6.2 (New), IPC [E] 607.2.1, IPC [E] 607.2.1.1, IPC [E] 607.2.1.2, R403.4.1 (IRC N1103.4.1), R403.4.1.1 (New) (IRC N1103.4.1.1 New), R403.4.1.2 (New) (IRC N1103.4.1.2 New)

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, Grundfos, representing self (gtowsley@grundfos.com)

PART I - IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 ~~Hot~~ Heated water system controls. Circulating hot water system pumps or heat trace water temperature maintenance systems shall be controlled in accordance with Sections C404.6.1 and C406.6.2. ~~arranged to be turned off either automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls.~~ *A*utomatic controls, temperature sensors, and pumps shall be *accessible*. Manual controls shall be *readily accessible*. Heated water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in heated water circulation systems shall be prohibited.

C404.6.1 Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for heated water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

C404.6.2 Heat trace. Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.

Reason: The current code text allows for the use of continuously operating circulation pumps in a hot water system. With no limitation of prohibiting pumps that operate continuously, this control methodology is not energy efficient, even when there is no need for hot water or there is ample hot water available in the system.

Energy can be saved with circulating hot water systems by operating the pump only when there is a demand for hot water. In addition, the pump does not need to operate when the hot water system is capable of providing the hot water at the desired temperature.

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

C404.6-EC-TOWSLEY.DOC

Committee Action Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee liked the intent of the proposal but there could be some unintended consequences with regard to prohibiting continuous operation of pumps.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C404.6 Heated water system controls. Circulating hot water system pumps or heat trace water temperature maintenance systems shall be controlled in accordance with Sections C404.6.1~~ and C406.6.2~~. *A*utomatic controls, temperature sensors, and pumps shall be *accessible*. Manual controls shall be *readily accessible*. Heated water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in heated water circulation systems shall be prohibited.

C404.6.1 Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for heated water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

~~**C404.6.2 Heat trace.** Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.~~

Commenter's Reason: The Committee liked the intent of the original proposal because of the opportunity to reduce pumping energy in domestic hot water system AND allow for new automated and intuitive technologies to controls pumps. The Committee rejected this proposal because of concerns with "unintended consequences with regard to prohibiting continuous operation of pumps." In trying to research a response for the Committee's concern, I was unable to find any potential "unintended consequences" I was actually able to determine that California, Europe and the IGCC actually allow stopping or prohibiting continuous operation of the circulation pumps. As this proposal is for the IECC, it should be included in the code. The modifications shown above focuses the code change only on the circulating pump controls and eliminates any newly proposed reference to "heat trace" systems that are covered under other proposals.

CE280-13, Part I
Final Action: AS AM AMPC____ D

CE280-13, Part II

C404.6, C404.6.1 (New), C404.6.2 (New), IPC [E] 607.2.1, IPC [E] 607.2.1.1, IPC [E] 607.2.1.2, R403.4.1 (IRC N1103.4.1), R403.4.1.1 (New) (IRC N1103.4.1.1 New), R403.4.1.2 (New) (IRC N1103.4.1.2 New)

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, Grundfos, representing self (gtowsley@grundfos.com)

PART II - IPC

Revise as follows:

[E] 607.2.1 Hot water system controls. ~~Automatic~~ Circulating hot water system pumps ~~or~~ and heat trace water temperature maintenance systems shall be controlled in accordance with Sections 607.2.1.1 and 607.2.1.2. ~~arranged to be turned off automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls.~~ *Access* shall be provided to automatic controls, temperature sensors, and pumps. *Ready access* shall be provided to manual controls. Hot water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in hot water circulation systems shall be prohibited.

[E] 607.2.1.1 Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for heated water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

[E] 607.2.1.2 Heat trace. Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.

Reason: The current code text allows for the use of continuously operating circulation pumps in a hot water system. With no limitation of prohibiting pumps that operate continuously, this control methodology is not energy efficient, even when there is no need for hot water or there is ample hot water available in the system.

Energy can be saved with circulating hot water systems by operating the pump only when there is a demand for hot water. In addition, the pump does not need to operate when the hot water system is capable of providing the hot water at the desired temperature.

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

C404.6-EC-TOWSLEY.DOC

Committee Action Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: Disapproved

Committee Reason: The committee liked the intent of the proposal but there could be some unintended consequences with regard to prohibiting continuous operation of pumps.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[E] 607.2.1 Hot water system controls. Circulating hot water system pumps and heat trace water temperature maintenance systems shall be controlled in accordance with Sections 607.2.1.1 ~~and 607.2.1.2~~. *Access* shall be provided to automatic controls, temperature sensors, and pumps. *Ready access* shall be provided to manual controls. Hot water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in hot water circulation systems shall be prohibited.

E] 607.2.1.1 Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for heated water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

~~**[E] 607.2.1.2 Heat trace.** Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.~~

Commenter's Reason: The Committee liked the intent of the original proposal because of the opportunity to reduce pumping energy in domestic hot water system AND allow for new automated and intuitive technologies to controls pumps. The Committee rejected this proposal because of concerns with "unintended consequences with regard to prohibiting continuous operation of pumps." In trying to research a response for the Committee's concern, I was unable to find any potential "unintended consequences" I was actually able to determine that California, Europe and the IGCC actually allow stopping or prohibiting continuous operation of the circulation pumps. As this proposal is for the IECC, it should be included in the code. The modifications shown above focuses the code change only on the circulating pump controls and eliminates any newly proposed reference to "heat trace" systems that are covered under other proposals.

CE280-13, Part II
Final Action: AS AM AMPC____ D

CE280-13, Part III
C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

<u>Proposed Change as Submitted</u>

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART III – IECC-RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

<u>**CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.</u>

Reason: A definition of a "circulating hot water system" does not exist in the code, yet it is referenced in the IRC and other ICC codes. This definition brings clarity to how a "circulating hot water system" should be designed and operated. In the codes and sections where "circulating hot water system" is used, this definition would also reduce the probability of confusion between hot water systems used for space heating or tempered water. Currently, the only place that the term CIRCULATING HOT WATER SYSTEM shows up in the code is IECC Section C404.6, IPC [E] 607.2.1 and IECC Section R403.4.1 (IRC N1103.4.1). Other proposals by other proponents will most likely be adding language that uses this term so it is important to have the term defined.

As referenced in CHAPTER 50 - SERVICE WATER HEATING of *ASHRAE Handbook-HVAC Applications* (2011, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.), "Some recirculation-loop systems...are equipped with circulating pumps to force water through the piping and back to the water heater, thus keeping water in the piping hot." Adding this definition in the code will be consistent with industry's understanding.

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

C202-CIRCULATING HOT WATER SYSTEM (NEW)-EC-TOWLSEY.doc

<u>Committee Action Hearing Results</u>

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART III – IECC – Residential
Committee Action: Disapproved

Committee Reason: There needs to be a definition for heat trace because it is not understood what that is.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.4.1 (N1103.4.1) Circulating hot water systems (Mandatory). Circulating hot water systems ~~and heat trace water temperature maintenance systems~~ shall be controlled in accordance with Sections R403.4.1.1~~ and R403.4.1.2~~. Automatic controls, temperature sensors, and pumps shall be *accessible*. Manual controls shall be *readily accessible*. Hot water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in hot water circulation systems shall be prohibited.

R403.4.1.1 (N1103.4.1.1) Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

~~**R403.4.1.2 (N1103.4.1.2) Heat trace.** Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.~~

Commenter's Reason: The Committee generally thought the proposal was good because of the energy saving opportunity, especially the prohibition of gravity and thermo-syphon circulation systems and "openness" of the circulation pump control wording to allow for new, innovative technologies to be developed. The Committee rejected this proposal because of lack of a definition for heat trace. There was a lack of clarity as it related to "heat trace" systems in this section. To eliminate the confusion or understanding, especially as it relates to the focus of circulating systems with pumps, the proposal is being revised to delete the modification to add "heat trace".

CE280-13, Part III

Final Action: AS AM AMPC____ D

CE282-13, Part I

C404.7 (New), IPC Chapter 2, IPC [E]607.2.1.1 (New)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C404.7 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC).

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

C404.7-EC-KLEIN

Committee Action Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Submitted

Committee Reason: The proposal was approved to be consistent with a similar proposal that was approved for the IECC-Residential Provisions.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: I agree with the Committee's reason and urge your support of this proposal.

Public Comment 2:

Greg Towsley, Grundfos representing self, requests Approval as Modified by this Public Comment

Modify the proposal as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature of the water entering the cold water piping to ~~102ºF (38.9 ºC)~~ 104°F (40°C).

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

CE282-13, Part I
Final Action: AS AM AMPC____ D

CE282-13, Part II
C404.7 (New), IPC Chapter 2, IPC [E]607.2.1.1 (New)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II-IPC

Add new text as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

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Add definition as follows:

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one more pumps prime the service hot water piping with heated water upon demand for hot water.

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

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The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

C404.7-EC-KLEIN

Committee Action Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: Approved as Submitted

Committee Reason: The proposal properly aligns the *International Plumbing Code* with the IECC-CE and adds a necessary definition to the IPC.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: I agree with the Committee's reason and urge your support of this proposal.

Public Comment 2:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.
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Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

CE282-13, Part II
Final Action: AS AM AMPC____ D

CE283-13, Part I

C404.7 (NEW), Table C407.5.1(1), Chapter 5, R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED ONLY FOR INFORMATION PURPOSES FOLLOWING ALL OF PART III.

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gerald Van Decker, RenewABILTY Energy Inc., representing self (gerald@renewability.com), Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.7 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA 55.2. Potable water-side pressure loss shall be less than 10 psi at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA 55.1.

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Service water weating[f,g,h,j]	Fuel type: same as proposed	As proposed
	Efficiency: in accordance with Table C404.2	For Group R, as proposed multiplied by SWHF For other than Group R, as proposed multiplied by efficiency as provided by the manufacturer of the DWHR unit.
	Capacity: same as proposed	As proposed
	Where a service water hot water system does not exist or is not specified in the proposed design, a service hot water heating shall not be modeled.	

(Portions of Table not shown remain unchanged)

j. SWHF means service water heat recovery factor. DWHR means drain water heat recovery. The SWHF shall be applied as follows:

= (1 – (DWHR unit efficiency x 0.36))

where potable water from the DWHR unit supplies not less than 1 shower and not greater than 2 showers, of which the drain water from the same showers flows through the DWHR unit.
= (1 – (DWHR unit efficiency x 0.33))
where potable water from the DWHR unit supplies not less than 3 showers and not greater than 4 showers, of which the drain water from the same showers flows through the DWHR unit.
= (1 – (DWHR unit efficiency x 0.26))
where potable water from the DWHR unit supplies not less than 5 showers and not greater than 6 showers, of which the drain water from the same showers flows through the DWHR unit,
= 1.0
where the other conditions are not met.

Add new standards to Chapter 5 as follows:

CSA

CSA 55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units

CSA 55.2-2012 Drain water heat recovery units

Reason: There are two reasons for this proposal.1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this "coincident flow" occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

This change adds two standards for drain water heat recovery units (DWHR units). Drain water heat recovery is often a cost effective way to add to energy efficiency by recapturing hot water energy that is literally "going down the drain". The proposed standards have already been in use by designers for 10 years and the resulting ratings are in use by a variety of energy efficiency programs. Commercial (i.e. non multi-unit residential) applications are engineered systems while multi-unit residential applications are non-engineered and straightforward.

CSA B55.2 standard is for fabrication and material quality of DWHR units. The CSA B55.1 standard is for testing and labeling of DWHR units efficiency and pressure loss at 2.5gpm (9.5lpm). These existing standards were developed through a consensus process by the Canadian Standards Association and are referenced by the Ontario Building Code.

A typical drain water heat recovery unit is shown below:

POWER-PIPE®

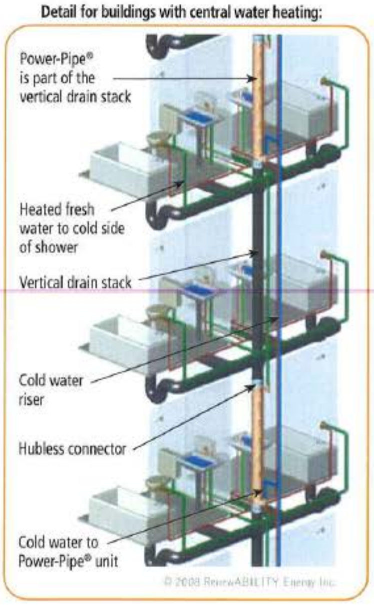
Drain Water Heat Recovery Systems

Reduce Operating Costs for Multi-Unit Residential Buildings

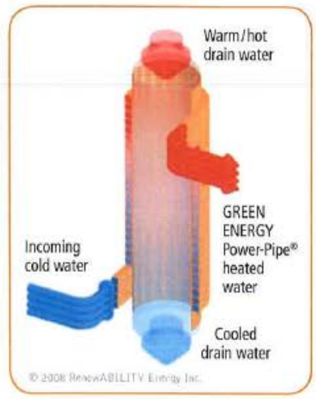
Cost-Effective Green Energy Technology

- The Power-Pipe® is **proven, practical, affordable** and in use today saving energy for thousands of residential suites.
- **Water heating is typically the second highest energy cost** in multi-unit residential buildings; in fact it can even be the highest energy cost.

Detail for buildings with central water heating:



- As building envelopes have become more efficient in recent years water heating has become an even larger portion of the remaining energy costs.
- Much of the drain water leaving a residential building carries with it valuable and recoverable heat energy.
- The all copper Power-Pipe is a double-wall heat exchanger that can **reduce water heating costs by 20-40%** by recovering heat energy from drain (waste) water in multi-residential building drain (waste) stacks.
- The patented and patent pending Power-Pipe design is the only heat exchanger that efficiently allows for up to 4 apartment suites to be plumbed without noticeable loss in water pressure... in fact this results in a **2 to 4 times faster payback** than other heat exchangers.
- The Power-Pipe is very **simple to specify and install** and its savings typically translate to a **3 to 4 year simple payback**; even faster with government or utility incentives.



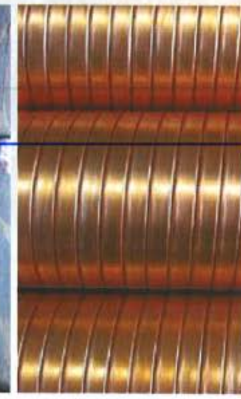
How It Works

1. As drain water falls down any vertical drain stack it clings to the inner wall, rather than going down the middle of the pipe. This results in a quickly falling thin film.
2. The energy (heat) from this falling film of drain water is easily and efficiently transferred through the copper to the fresh cold water which is flowing around the drain pipe in the outer coils.
3. Cold fresh water is plumbed into the bottom of the Power-Pipe from the main cold water riser.
4. Power-Pipe heated water is then plumbed to either:
   - the cold side of up to 4 showers, for buildings with central water heating, thereby reducing hot water demand
   - the cold side of the shower and water heater, for buildings with in-suite water heaters

877-606-5559
www.renewability.com

Advantages of the Power-Pipe®

- The Power-Pipe® is **very simple to install** during new construction and it integrates with any plumbing system
- The Power-Pipe **can be retrofit** in buildings where there is access to the drain stacks and fresh water lines
- Maintenance-free, 50+ year life
- The Power-Pipe will increase effective hot water capacity, thereby reducing the risk of running out of hot water
- **Quality** is never compromised; the coils of every Power-Pipe unit consist of 100% Type L or heavier copper tube
- The Power-Pipe also provides significant cost-effective **reductions in green house gases** as a result of reduced primary energy demand
- The performance of the Power-Pipe has been **verified by the Canadian Government** *(Ministry of Natural Resources Canada and the University of Waterloo)* in independent third-party testing
- The Power-Pipe will **assist in obtaining LEED Certification** (and similar programs) for your building
- Many Governments and Utilities also offer **financial incentives** resulting in a quicker payback
- The Power-Pipe is the most proven, most used drain water heat recovery technology; many building designers have been specifying the Power-Pipe as a standard in their buildings for many years now, there are now thousands of suites in which Power-Pipes are saving money and energy daily.



Sampling of Projects

Regent Park
Toronto, Ontario
New Construction – Affordable Housing

OMHM
Montreal, Quebec
New Construction – Affordable Housing

University of Toronto
Toronto, Ontario
Student Dorm

University of Oregon
Eugene, Oregon
Student Dorm

Yee Kang Centre
Montreal, Quebec
New Construction – Affordable Housing

Bury Court
Bedford, England
Retrofit – Affordable Housing

Prison
North Bend, Oregon
Retrofit – Government Facility

University of Waterloo
Waterloo, Ontario
Student Townhouses

Adelaide Project
Toronto, Ontario
New Construction – Affordable Housing

Hotel
North Battleford, Saskatchewan
New Construction

National Defense
Halifax, Nova Scotia
Officers Residence

Eastern Oregon University
Eugene, Oregon
Student Dorm

Maison Transitionelle
Montreal, Quebec
New Construction – Affordable Housing

Benny Farms
Montreal, Quebec
LEED Platinum Status and International Award

ETS
Montreal, Quebec
Student Dorm

Cloverdale Housing Coop
Montreal, Quebec
Retrofit – Affordable Housing

Applications Include:

• CONDOMINIUMS	• STUDENT DORMS
• APARTMENT BUILDINGS	• HOSPITALS
• HOTELS	• PRISONS
• AFFORDABLE HOUSING	• TOWNHOUSES

Developed and manufactured by:

RenewABILITY ENERGY INC.

What We Provide:

- We provide free and full support including feasibility analysis, design consultation, CAD drawing elements, and training.
- 10 Year Warranty

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

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R405.5.2(1)T-EC-VANDECKER.DOC

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee, Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Plumbing Code Development Committee.

For staff analysis of the content of CSA 55.1-2012 and CSA 55.2-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: Drain waste heat recovery seems to be a valuable energy saving idea but there is some confusion about whether the proposal has the correct computational method to adjust (increase) the efficiency of the service water heating system when these products are installed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self; Gerald Van Decker, RenewABILITY Energy Inc, representing self, request Approval as Submitted

Commenter's Reason: I agree with the Committee's reason that it is important for code officials, contractors and building owners to have recognized standards regarding safety and performance for building components. This code change provides these standards for drain water heat recovery units, and I urge your support of this code change.

CE283-13, Part I
Final Action: AS AM AMPC____ D

CE283-13, Part III

C404.7 (NEW), Table C407.5.1(1), Chapter 5, R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART III.

<u>Proposed Change as Submitted</u>

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gerald Van Decker, RenewABILTY Energy Inc., representing self (gerald@renewability.com), Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART III IRC-P

Add new text as follows:

<u>**P2903.11 Drain water heat recovery units.** Drain water heat recovery units shall be in accordance with Section N1103.4.3</u>

Reason: There are two reasons for this proposal.1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this “coincident flow” occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

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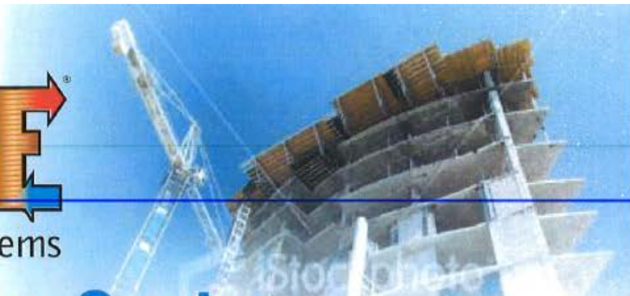
A typical drain water heat recovery unit is shown below:

POWER-PIPE®

Drain Water Heat Recovery Systems



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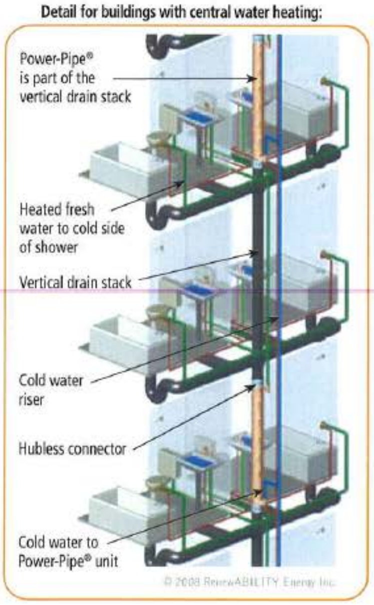
Detail for buildings with central water heating:



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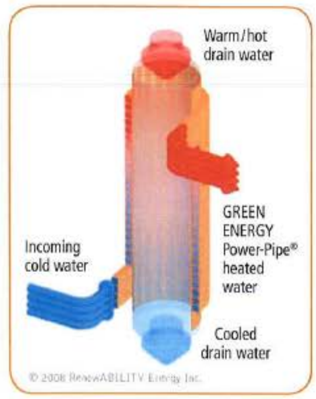
- The patented and patent pending Power-Pipe design is the only heat exchanger that efficiently allows for up to 4 apartment suites to be plumbed without noticeable loss in water pressure... in fact this results in a **2 to 4 times faster payback** than other heat exchangers.
- The Power-Pipe is very **simple to specify and install** and its savings typically translate to a **3 to 4 year simple payback**; even faster with government or utility incentives.



How It Works

1. As drain water falls down any vertical drain stack it clings to the inner wall, rather than going down the middle of the pipe. This results in a quickly falling thin film.
2. The energy (heat) from this falling film of drain water is easily and efficiently transferred through the copper to the fresh cold water which is flowing around the drain pipe in the outer coils.
3. Cold fresh water is plumbed into the bottom of the Power-Pipe from the main cold water riser.
4. Power-Pipe heated water is then plumbed to either:
   - the cold side of up to 4 showers, for buildings with central water heating, thereby reducing hot water demand
   - the cold side of the shower and water heater, for buildings with in-suite water heaters

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www.renewability.com

Advantages of the Power-Pipe®

- The Power-Pipe® is **very simple to install** during new construction and it integrates with any plumbing system
- The Power-Pipe **can be retrofit** in buildings where there is access to the drain stacks and fresh water lines
- Maintenance-free, 50+ year life
- The Power-Pipe will increase effective hot water capacity, thereby reducing the risk of running out of hot water
- **Quality** is never compromised; the coils of every Power-Pipe unit consist of 100% Type L or heavier copper tube
- The Power-Pipe also provides significant cost-effective **reductions in green house gases** as a result of reduced primary energy demand
- The performance of the Power-Pipe has been **verified by the Canadian Government** *(Ministry of Natural Resources Canada and the University of Waterloo)* in independent third-party testing
- The Power-Pipe will **assist in obtaining LEED Certification** (and similar programs) for your building
- Many Governments and Utilities also offer **financial incentives** resulting in a quicker payback
- The Power-Pipe is the most proven, most used drain water heat recovery technology; many building designers have been specifying the Power-Pipe as a standard in their buildings for many years now, there are now thousands of suites in which Power-Pipes are saving money and energy daily.

Applications Include:

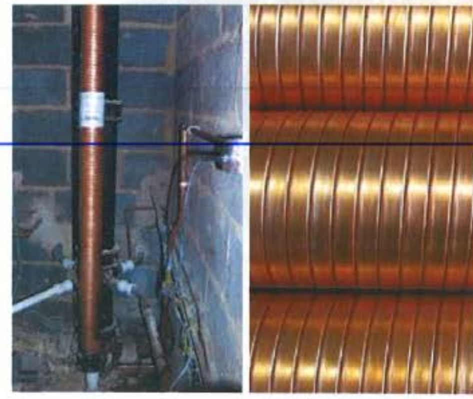
• CONDOMINIUMS	• STUDENT DORMS
• APARTMENT BUILDINGS	• HOSPITALS
• HOTELS	• PRISONS
• AFFORDABLE HOUSING	• TOWNHOUSES

Developed and manufactured by:

RenewABILITY ENERGY INC.

What We Provide:

- We provide free and full support including feasibility analysis, design consultation, CAD drawing elements, and training.
- 10 Year Warranty



Sampling of Projects

Regent Park
Toronto, Ontario
New Construction – Affordable Housing

OMHM
Montreal, Quebec
New Construction – Affordable Housing

University of Toronto
Toronto, Ontario
Student Dorm

University of Oregon
Eugene, Oregon
Student Dorm

Yee Kang Centre
Montreal, Quebec
New Construction – Affordable Housing

Bury Court
Bedford, England
Retrofit – Affordable Housing

Prison
North Bend, Oregon
Retrofit – Government Facility

University of Waterloo
Waterloo, Ontario
Student Townhouses

Adelaide Project
Toronto, Ontario
New Construction – Affordable Housing

Hotel
North Battleford, Saskatchewan
New Construction

National Defense
Halifax, Nova Scotia
Officers Residence

Eastern Oregon University
Eugene, Oregon
Student Dorm

Maison Transitionelle
Montreal, Quebec
New Construction – Affordable Housing

Benny Farms
Montreal, Quebec
LEED Platinum Status and International Award

ETS
Montreal, Quebec
Student Dorm

Cloverdale Housing Coop
Montreal, Quebec
Retrofit – Affordable Housing

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

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R405.5.2(1)T-EC-VANDECKER.DOC

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee, Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Plumbing Code Development Committee.

For staff analysis of the content of CSA 55.1-2012 and CSA 55.2-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART III – IRC – Plumbing
Committee Action: Disapproved

Committee Reason: There is no need to have this pointer in the plumbing chapter as the information is contained in the IRC and not some other publication.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self; Gerald Van Decker, RenewABILITY Energy Inc, representing self, request Approval as Modified by this Public Comment.

Modify proposal as follows:

P2903.11 Drain water heat recovery units. Drain water heat recovery units <u>that are installed for heat recovery</u> shall ~~be in accordance with~~ <u>meet the requirements of</u> Section N1103.4.3.

Commenter's Reason: Drain water heat recovery systems are relatively uncommon in residential construction at this time. Their installation affects the design and layout of the overall domestic piping supply and may affect other building subsystems. Having a reference in the plumbing chapter will help to avoid lapses in coordination with other trades and will improve the ease of compliance.

CE283-13, Part III
Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

PART II IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

<u>**R403.4.3 (N1103.4.3) Drain water heat recovery units.** Drain water heat recovery units shall comply with CSA 55.2. Drain water heat recovery units shall be in accordance with CSA 55.1. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi (20.7 kPa) for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi (13.8 kPa) for individual units connected to three or more showers.</u>

Add new standards to Chapter 5 as follows:

CSA

CSA 55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units

CSA 55.2-2012 Drain water heat recovery units

PART III IRC-P

Add new text as follows:

P2903.11 Drain water heat recovery units. Drain water heat recovery units shall be in accordance with Section N1103.4.3

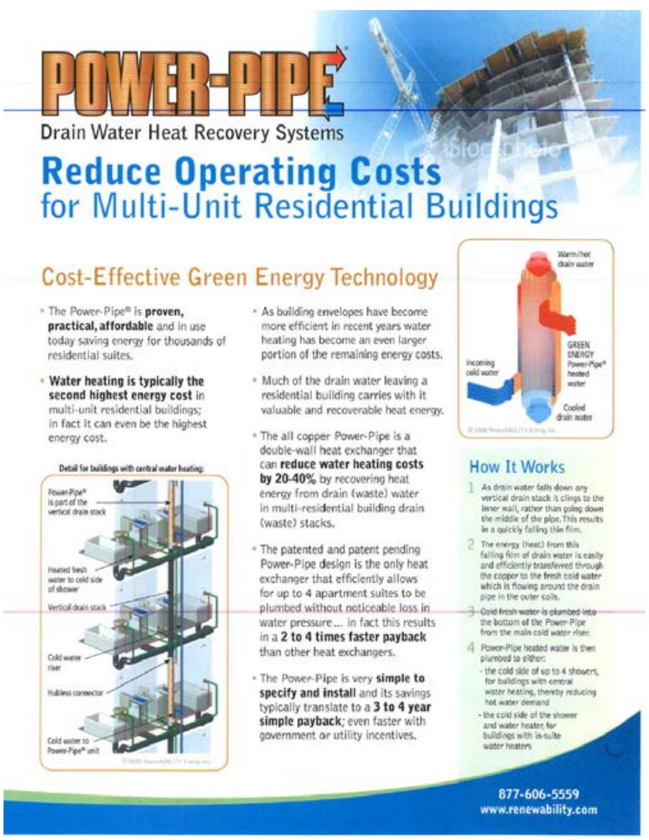
Reason: There are two reasons for this proposal.1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this "coincident flow" occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

This change adds two standards for drain water heat recovery units (DWHR units). Drain water heat recovery is often a cost effective way to add to energy efficiency by recapturing hot water energy that is literally "going down the drain". The proposed standards have already been in use by designers for 10 years and the resulting ratings are in use by a variety of energy efficiency programs. Commercial (i.e. non multi-unit residential) applications are engineered systems while multi-unit residential applications are non-engineered and straightforward.

CSA B55.2 standard is for fabrication and material quality of DWHR units. The CSA B55.1 standard is for testing and labeling of DWHR units efficiency and pressure loss at 2.5gpm (9.5lpm). These existing standards were developed through a consensus process by the Canadian Standards Association and are referenced by the Ontario Building Code.

A typical drain water heat recovery unit is shown below:



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

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee, Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Plumbing Code Development Committee.

For staff analysis of the content of CSA 55.1-2012 and CSA 55.2-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: Massachusetts recognizes drain waste heat recovery units in their "stretch" code. If these units are going to be installed, then there needs to be requirements to make sure the units operate properly and provide the intended performance.

Assembly Action: **None**

CE285-13, Part I
C202, C405.1, R202 (IRC N1109.1) R404.1 (IRC N1104.1)

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED ONLY FOR INFORMATION PUSPOSES FOLLOWING ALL OF PART I.

Proposed Change as Submitted

Proponent: Deborah Frankhouser, Four Point Lighting Design, representing the International Association of Lighting Designers (deborah@fourpointlighting.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

> **Exception:** Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that they comply with Section R404.1. ~~not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps.~~

Delete definition without substitution as follows:

SECTION C202
GENERAL DEFINITIONS

~~**HIGH-EFFICACYLAMPS.** Compact fluorescent lamps, T-8 or smaller diameter fluorescent lamps, or lamps with a minimum efficacy of:~~

1. ~~60 lumens per watt for lamps over 40 watts,~~
2. ~~50 lumens per watt for lamps over 15 watts to 40 watts,~~
3. ~~40 lumens per watt for lamps 15 watts or less.~~

Reason: (Part I) The exception to C405.1 establishes a different standard for lighting efficiency in dwellings from Section R404.1. Section C405.1 is a luminaire-based standard, whereas Section R404.1 is a lamp-based standard. There is no reason for the code to set an efficiency standard for lighting within dwelling units in multi-family buildings that is different from the standard for lighting in detached houses. Residential lighting is the same regardless of the building it is located in.
(Part II):
1. Increases the overall requirement for high-efficiency luminaires from 75% to 100% with certain exceptions designed to save energy and provide maximum flexibility to designers, owners and code officials.
2. Changes the Chapter 2 definitions from *high efficacy lamps* to *high efficiency luminaires* as determined by lamp efficacy. This means owners, designers, and building code officials would count luminaires (light fixtures) vs. counting light bulbs to determine the amount of high or low efficient lighting on a project. Luminaires often have multiple lamps, making counting more cumbersome for both the owner/designer as well as the code official. By counting luminaires, the code official simply has to identify lamp type, but doesn't have to count individual lamps within each luminaire.
3. Allows for an optional and more flexible energy savings approach for owners and designers by allowing up to 50% low efficiency luminaires as long as lighting controls are used to reduce or turn off the low efficiency luminaires.

   The current code requires 75% of lighting to be *high-efficacy.* However, there is a high amount of dissatisfaction with compact fluorescents because of their poor color, noise, incompatibility with dimming, and mercury content. (Reference, Dept. of Energy's "Compact Fluorescent Lighting in America: Lessons Learned on the Way to Market," prepared by Pacific Northwest National Laboratory, June 2006) LED technology is still emerging and many of the inexpensive LED's continue to have poor color and incompatibility with dimming.

The most efficient light is the one that is off. The current code does not use lighting controls as a means of energy savings. Regardless of efficacy, light sources achieve maximum energy savings when they are off or reduced to the minimum required by the task. For 120 volt incandescent/halogen sources, dimming reduces energy use, increases lamp life, and dimmers are inexpensive. Automatic controls turn lighting off when not being used. (See reference documentation listed below.)

Cost implications: In most cases, the required high efficiency Fluorescent and LED light fixtures are more expensive than their low efficiency 120 volt incandescent equivalents simply because fluorescent and LED have additional required components such as ballasts and drivers. Dimmers vary significantly in cost, but a 120v incandescent dimmer can be purchased for as little as $15. When installed with the less expensive 120v incandescent lighting, this combination can be less expensive than purchasing many fluorescent or LED versions controlled by a switch. There are many options for owners and adding dimmers does not necessarily equal adding dollars when comparing low efficiency and high efficiency luminaires. Also, in residential, dimming is important for reasons other than energy savings and dimming fluorescent and LED sources can significantly increase dimming costs.

Residential is not commercial. In residences, it is very common for decorative lighting to be the main lighting source in a room. Decorative chandeliers are often only available in120v incandescent medium or candelabra based sockets. Often times these chandeliers exceed the current allowance (25%) even when using high efficacy light sources for other types of architectural lighting such as down lights, task lighting, etc. These fixtures do not qualify for the Low Voltage Exception currently in the code. The proposed Exception 2 gives a greater allowance for 120v incandescent/halogen luminaires than the current code allows to accommodate these decorative products, but encourages energy savings through the use of controls.

4. Clarifies the low voltage lighting exception currently in the code and adds stringency by requiring lighting controls as an energy savings approach for these light fixture types. The current code allows for the use of low voltage with no limits. They are lower in VOLTAGE not WATTAGE. Adding controls will increase the overall energy efficiency of these products.

References

Several reports document savings from using controls residentially, such as:

- http://www.lrc.rpi.edu/programs/lightingTransformatio/economics/table2.asp [shows 20% to 40% savings depending on space type for using occupancy sensors]
- http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/ open Residential Lighting PDF and see page 32 [shows 10% savings from dimmers, 30% savings from occupancy sensors]
- Heschong Mahone Group Lighting Efficiency Technology Report Vol. 1, see page 83. www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF [shows 20% savings from dimmers and 54% savings from occupancy sensors]

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

C405.1-EC-FRANKHOUSER.doc

Committee Action Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial

Committee Action: **Approved as Submitted**

Committee Reason: Lighting within residential units should comply with consistent standards. Those are provided best in the Residential portion of the IECC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Donald J. Vigneau, AIA, representing Northeast Energy Efficiency Partnerships Inc, requests Disapproval.

Commenter's Reason: The proposal may be well-intentioned but essentially flawed. It eliminates a general definition for all high-efficiency bulbs that is needed for compliance with other Section C405 lighting requirements; the Residential Committee AS decision referenced would allow for lighting inconsistent with the requirements of Table C405.5.2(1). The proposal also eliminates other lighting solutions that are not encompassed by the minimal number of lamp types listed. Disapproval is needed for consistency with the RE Committee recommendation for Disapproval.

CE285-13, Part I

Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

CE285-13, PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). ~~A minimum of 75 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps or a minimum of 75 percent of the permanently installed lighting fixtures shall contain only high efficacy lamps.~~ All permanently installed lighting shall be *high efficiency luminaires*.

Exception: ~~Low-voltage lighting shall not be required to use high-efficiency lamps.~~

1. Luminaires that utilize lamps that operate at less than 25 volts if separately controlled by a dimmer or an *automatic* control device and controlled separately from *high-efficiency luminaires.*
2. Up to 50 percent of the luminaires not qualifying for Exception 1 shall be permitted to be other than *high-efficiency luminaires* if they are controlled by a dimmer or *automatic* control device. *High- efficiency luminaires* shall be controlled separately from non *high-efficiency luminaires*.

Revise definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

HIGH-EFFICIENCY ~~EFFICACY~~ ~~LAMPS~~ LUMINAIRES. Luminaires containing only compact fluorescent lamps, T-8 or smaller diameter fluorescent lamps with electronic ballasts, or lamps or light emitting diodes (LED's) with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts,
2. 50 lumens per watt for lamps over 15 watts to 40 watts,
3. 40 lumens per watt for lamps 15 watts or less.

Reason:
(Part I) The exception to C405.1 establishes a different standard for lighting efficiency in dwellings from Section R404.1. Section C405.1 is a luminaire-based standard, whereas Section R404.1 is a lamp-based standard. There is no reason for the code to set an efficiency standard for lighting within dwelling units in multi-family buildings that is different from the standard for lighting in detached houses. Residential lighting is the same regardless of the building it is located in.
(Part II):

5. Increases the overall requirement for high-efficiency luminaires from 75% to 100% with certain exceptions designed to save energy and provide maximum flexibility to designers, owners and code officials.
6. Changes the Chapter 2 definitions from *high efficacy lamps* to *high efficiency luminaires* as determined by lamp efficacy. This means owners, designers, and building code officials would count luminaires (light fixtures) vs. counting light bulbs to determine the amount of high or low efficient lighting on a project. Luminaires often have multiple lamps, making counting more cumbersome for both the owner/designer as well as the code official. By counting luminaires, the code official simply has to identify lamp type, but doesn't have to count individual lamps within each luminaire.
7. Allows for an optional and more flexible energy savings approach for owners and designers by allowing up to 50% low efficiency luminaires as long as lighting controls are used to reduce or turn off the low efficiency luminaires.
   The current code requires 75% of lighting to be *high-efficacy.* However, there is a high amount of dissatisfaction with compact fluorescents because of their poor color, noise, incompatibility with dimming, and mercury content. (Reference,

Dept. of Energy's "Compact Fluorescent Lighting in America: Lessons Learned on the Way to Market," prepared by Pacific Northwest National Laboratory, June 2006) LED technology is still emerging and many of the inexpensive LED's continue to have poor color and incompatibility with dimming.

The most efficient light is the one that is off. The current code does not use lighting controls as a means of energy savings. Regardless of efficacy, light sources achieve maximum energy savings when they are off or reduced to the minimum required by the task. For 120 volt incandescent/halogen sources, dimming reduces energy use, increases lamp life, and dimmers are inexpensive. Automatic controls turn lighting off when not being used. (See reference documentation listed below.)

Cost implications: In most cases, the required high efficiency Fluorescent and LED light fixtures are more expensive than their low efficiency 120 volt incandescent equivalents simply because fluorescent and LED have additional required components such as ballasts and drivers. Dimmers vary significantly in cost, but a 120v incandescent dimmer can be purchased for as little as $15. When installed with the less expensive 120v incandescent lighting, this combination can be less expensive than purchasing many fluorescent or LED versions controlled by a switch. There are many options for owners and adding dimmers does not necessarily equal adding dollars when comparing low efficiency and high efficiency luminaires. Also, in residential, dimming is important for reasons other than energy savings and dimming fluorescent and LED sources can significantly increase dimming costs.

Residential is not commercial. In residences, it is very common for decorative lighting to be the main lighting source in a room. Decorative chandeliers are often only available in120v incandescent medium or candelabra based sockets. Often times these chandeliers exceed the current allowance (25%) even when using high efficacy light sources for other types of architectural lighting such as down lights, task lighting, etc. These fixtures do not qualify for the Low Voltage Exception currently in the code. The proposed Exception 2 gives a greater allowance for 120v incandescent/halogen luminaires than the current code allows to accommodate these decorative products, but encourages energy savings through the use of controls.

8. Clarifies the low voltage lighting exception currently in the code and adds stringency by requiring lighting controls as an energy savings approach for these light fixture types. The current code allows for the use of low voltage with no limits. They are lower in VOLTAGE not WATTAGE. Adding controls will increase the overall energy efficiency of these products.

References

Several reports document savings from using controls residentially, such as:

- http://www.lrc.rpi.edu/programs/lightingTransformatio/economics/table2.asp [shows 20% to 40% savings depending on space type for using occupancy sensors]
- http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/ open Residential Lighting PDF and see page 32 [shows 10% savings from dimmers, 30% savings from occupancy sensors]
- Heschong Mahone Group Lighting Efficiency Technology Report Vol. 1, see page 83. www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF [shows 20% savings from dimmers and 54% savings from occupancy sensors]

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

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: This code change proposal was disapproved in favor of RE150-13.

Assembly Action: **None**

CE286-13
C405.1, C405.8 (New)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, controls for electric receptacles, and minimum acceptable lighting equipment for exterior applications.

> **Exception:** Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps.

C405.8 Automatic receptacle control. Automatic controls shall be provided for at least 50 percent of the 125 volt 15- and 20-Ampere receptacles in private offices, computer classrooms and individual workstations and receptacles associated with branch circuit feeds that are installed to supply electrical power to modular furniture in such spaces. These receptacles shall be labeled "Automatic Control Receptacle". The automatic controls shall:

1. Be capable of operating on a scheduled basis using a time-of-day operated control device that will turn receptacles off at specific programmed times and provide for an independent program schedule for areas not larger than 25,000 square feet but not larger than one floor, or
2. Be an occupant sensor that is capable of turning receptacles off within 30 minutes of all occupants leaving a *space*, or
3. Be capable of providing a signal to another control or alarm system that indicates the area is unoccupied.

> **Exceptions:** Automatic receptacle controls need not be provided for:
>
> 1. Receptacles specifically designated for equipment requiring 24 hour operation.
> 2. Spaces where an automatic shutoff would endanger the safety or security of the room or building occupants.

Reason: Energy is used in supplying power to receptacles in offices, computer classrooms, individual work stations and modular furniture in such spaces. As with occupancy sensors that can reduce energy use associated with lighting and mechanical ventilation, the equipment supported by electrical receptacles is also subject to use and non-use based on occupancy. ASHRAE/IES Standard 90.1, which is adopted by reference in the IECC Commercial Provisions, contains provisions to provide for at least half of the electrical receptacles in certain spaces to have automatic controls as enhanced by addendum v to the standard. This change ensures consistency between the IECC Commercial Provisions and the latest criteria in standard 90.1.

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

C405.1-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The technology to reduce power usage should be within the equipment and not rely on the building circuitry. Modular furniture is too easily broken down and reused to allow this to be enforceable by the code official.

Assembly Action: **Approved as Modified**

Modify the proposal as follows:

C405.8 Automatic receptacle control. Automatic controls shall be provided for at least 50 percent of the 125 volt 15- and 20-ampere receptacles in private offices, computer classrooms, individual workstations and receptacles associated with branch circuit feeds that are installed to supply electrical power to modular furniture in such spaces. ~~These receptacles shall be labeled "Automatic Control Receptacle."~~

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified and because public comments were submitted.

Public Comment 1:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C405.8 Automatic receptacle control. Automatic controls shall be provided for at least 50 percent of the 125 volt 15- and 20-ampere receptacles in private offices, computer classrooms, individual workstations and receptacles associated with branch circuit feeds that are installed to supply electrical power to modular furniture in such spaces. ~~These receptacles shall be labeled "Automatic Control Receptacle."~~ All controlled receptacles shall be permanently marked to visually differentiate them from uncontrolled receptacles.

Commenter's Reason: The previous language was too precise in handling how receptacles that are controlled are labeled. The intent was not to specify exact language that must appear on controlled receptacles. There must be some sort of way to visually differentiate controlled receptacles from non-controlled receptacles.
This comment adds language to clarify that.

Public Comment 2:

Duane Jonlin, City of Seattle, Department of Planning and Development requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.8 Automatic receptacle control. Automatic controls shall be provided for at least 50 percent of the 125 volt 15- and 20-Ampere receptacles in private offices, computer classrooms and individual workstations and receptacles associated with branch circuit feeds that are installed to supply electrical power to modular furniture in such spaces. ~~These receptacles shall be labeled "Automatic Control Receptacle."~~ These receptacles shall be visibly differentiated from non-controlled receptacles. The automatic controls shall:

1. Be capable of operating on a scheduled basis using a time-of-day operated control device that will turn receptacles off at specific programmed times and provide for an independent program schedule for areas not larger than 25,000 square feet but not larger than one floor. The device shall be capable of being overridden for periods of up to two hours by an override timer switch accessible to occupants. Each override switch shall control the controlled receptacles for a maximum area of 5,000 square feet (465 m2), and shall be permitted to control the lighting for the same area, or
2. Be an occupant sensor that is capable of turning receptacles off within 30 minutes of all occupants leaving a *space*, or
3. Be capable of providing a signal to another control or alarm system that indicates the area is unoccupied.

   Exceptions: Automatic receptacle controls need not be provided for:

   1. Receptacles specifically designated for equipment requiring 24 hour operation.
   2. Spaces where an automatic shutoff would endanger the safety or security of the room or building occupants.

Commenter's Reason: We support this code provision as an effective means of reducing building energy use.
We propose that the automatic time switch controls include an override switch to provide for convenient off-hours use of the receptacles controlled by the time switch. This parallels the override switch provisions for lighting controls, and in most cases can be provided with the same override switch.
In addition, we propose that the controlled receptacles be visually differentiated from the non-controlled receptacles.

Public Comment 3:

Andrei Moldoveanu, representing The National Electrical Manufacturers Association (NEMA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.8 Automatic receptacle control. Automatic controls shall be provided for at least 50 percent of the 125 volt 15- and 20-ampere receptacles in private offices, computer classrooms, individual workstations and receptacles associated with branch circuit feeds that are installed to supply electrical power to modular furniture in such spaces.

Use the following guidelines for determining how to meet the requirement:

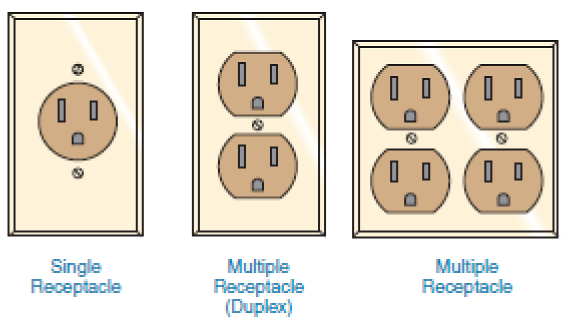
- If the receptacle outlets are single receptacles then 50 percent of them must be controlled. It may be necessary to add controlled receptacles.
- If the receptacle outlets are duplex receptacles then the devices may be split wired with one half being controlled. Alternatively additional controlled duplex receptacles could be added nearby.
- If the receptacle outlet consists of multiple receptacles then the devices may be split wired as above or half of the receptacles may be separately wired to achieve the 50 percent controlled requirement.
- In a defined workspace such as with modular partitions, 50 percent of the receptacles in each area accessible to the occupant must be controlled, i.e. one area would be above the desktop and another area might be below. See receptacle definitions below.

Receptacle Definitions according to 2011 NEC.

Receptacle: A receptacle is a contact device installed at the outlet for the connection of an attachment plug. A single receptacle is a single contact device with no other contact device on the same yoke. A multiple receptacle is two or more contact devices on the same yoke.

Receptacle Outlet: An outlet where one or more receptacles are installed.

Each of the three pictures below is a Receptacle Outlet as there are one or more receptacles installed at the location. 1 & 2 are also simple Receptacles as the contact devices are all on one yoke.



Commenter's Reason: The requirement language is difficult to interpret in the field: as written it's not clear if it calls for half of a duplex receptacle or half of the outlets in a room to be controlled.

Public Comment 3:

Hope Medina, City of Cherry Hills Village, CO, representing self, requests Disapproval.

Commenter's Reason: The committee's reasoning behind disapproving this code change has merit. We should be looking at the equipment to reduce power usage not the building's circuitry. This change no longer holds industry responsible for reducing it's energy usage.

This change not only over reaches the philosophy of this is a minimum/base code it potentially creates a life safety issue. When faced with receptacles providing power under these conditions an alternative means will be found, and it will involve power strips plugged into extension cords plugged into power strips plugged into extension cords.

CE286-13

Final Action: AS AM AMPC____ D

CE287-13

C202 (New), C405.2, C405.2.1, C405.2.1.1, C405.2.2, C405.2.2.1, C405.2.1.1, C405.2.1.2, C405.2.2, C405.2.2.1, C405.2.2.3, C405.2.2.3.1, C405.2.2.3.2, C405.2.2.3.3, C405.2.3, C405.2.4

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C405.2 Lighting Controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, ~~and~~ C405.2.4, and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted;
2. Stairways and corridors; and
3. Emergency egress lighting that is normally off.

~~**C405.2.1 Manual lighting controls.** All buildings shall include manual lighting controls that meet the requirements of Sections C405.2.1.1 and C405.2.1.2.~~

~~**C405.2.2.2**~~ **C405.2.1 Occupant ~~sensors~~ sensor controls.** *Occupant* ~~sensors~~ *sensor controls* shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, storage rooms and janitorial closets, and other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions. ~~These automatic control devices shall be installed to~~

C405.2.1.1 Occupant sensor control function. Occupant sensor controls shall comply with the following:

1. Automatically turn off lights within 30 minutes of all occupants leaving the space; ~~and~~
2. Shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power; and
3. Shall incorporate a *manual control* to allow occupants to turn lights off.

Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants

~~**C405.2.1.1 Interior lighting controls.** Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.~~

~~**Exceptions:**~~

1. ~~Areas designated as security or emergency areas that need to be continuously lighted.~~
2. ~~Lighting in stairways or corridors that are elements of the means of egress.~~

C405.2.2 ~~Additional lighting~~ Time switch controls. ~~Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3.~~

Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with Section C405.2.2.1.

Exceptions: Where a *manual control* provides light reduction in accordance with Section C405.2.2.2, automatic controls ~~additional lighting controls~~ ~~need not be provided~~ shall not be required for the following:

1. *Sleeping units*.
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.

C405.2.2.1 ~~Automatic~~ Time switch control ~~devices~~ function. ~~Automatic time switch controls shall be installed to control lighting in all areas of the building.~~ Each space provided with *time switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section C405.2.2.2. *Time switch controls* shall include an override switching device that complies with the following:

~~**Exceptions:**~~

~~1. Emergency egress lighting does not need to be controlled by an automatic time switch.~~
~~2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.~~

~~The automatic time switch control device shall include an override switching device that complies with the following:~~

1. The override switch shall be a *manual control* ~~in a readily accessible location;~~
~~2. The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;~~
~~3. The override switch shall permit manual operation;~~
2. ~~4.~~ The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum duration of 2 hours; and
3. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m^2).

Exceptions:

1. Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:
   - ~~1.~~ 1.1. The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
   - ~~2.~~ 1.2. The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m^2), but shall not exceed 20,000 square feet (1860 m^2).
2. Where provided with *manual control*, the following areas are not required to have light reduction control:
   - 2.1. Spaces that have only one luminaire with a rated power of less than 100 watts;
   - 2.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2); and
   - 2.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.

~~C405.2.1.2~~ C405.2.2.2 Light reduction controls. ~~Each area that is required to have a manual control shall also allow the occupant to~~ Spaces required to have light reduction controls shall have a *manual control* that allows the occupant to reduce the connected lighting load in a reasonably uniform pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other *approved* methods:

1. Controlling all lamps or luminaires;
2. Dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps;

3. Switching the middle lamp luminaires independently of the outer lamps; or
4. Switching each luminaire or each lamp.

Exception: Light reduction controls ~~need not be provided in the following areas and spaces:~~ are not required in daylight zones with *daylight responsive controls* complying with C405.3.2.

1. ~~Areas that have only one luminaire, with rated power less than 100 watts.~~
2. ~~Areas that are controlled by an occupant-sensing device.~~
3. ~~Corridors, equipment rooms, storerooms, restrooms, public lobbies, electrical or mechanical rooms.~~
4. ~~Sleeping unit (see Section C405.2.3).~~
5. ~~Spaces that use less than 0.6 watts per square foot (6.5 W/m^2).~~
6. ~~Daylight spaces complying with Section C405.2.2.3.2.~~

C405.2.2.3 Manual controls. *Manual controls* for lights shall meet the following requirements:

1. Shall be readily accessible to occupants; and
2. Shall be located where the controlled lights are visible; or the control shall identify the area served by the lights and indicate their status.

~~C405.2.2.3~~ C405.3 Daylight zone control. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.1~~ C405.3.1 Manual daylight controls. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.2 Automatic daylight controls.~~ C405.3.2 Daylight responsive controls. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.3~~ C405.3.3 Multi-level lighting controls. *(Portions of text not shown remains unchanged)*

~~C405.2.3~~ C405.2.4 Specific application controls. *(Portions of text not shown remains unchanged)*

~~C405.2.4~~ C405.2.5 Exterior lighting controls. *(Portions of text not shown remains unchanged)*

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

TIME SWITCH CONTROL. An automatic control device or system that controls lighting or other loads, including switching off, based on time schedules.

OCCUPANT SENSOR CONTROL. An automatic control device or system that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

Overview:

This proposal reorganizes, but does not delete requirements related to lighting controls in the 2012 IECC.
Section C405.2 of the 2012 IgCC is confusing. It puts information that is often irrelevant first, and surprises with essential and relevant information only after one has suffered through trying to decipher what the implications of the irrelevant information might be. Section C405.2 also contains redundant information and the relationship of various subsections of C405.2 to one another is often unclear and ambiguous. This proposal reorganizes Section C405.2 to provide the clarity that is necessary for its proper application and enforcement. This proposal is a reorganization only and does not contain technical changes or increases or decreases in stringency.

Section C405.2:

According to the IBC, all interior stairways and corridors are elements of the means of egress. The original intent of this language may have been to exempt corridors and stairways which are part of an exit as defined by the IBC, but the way the code is currently written it also exempts exit access and exit discharge components, i.e. the entire building. Exceptions 1 and 2 are moved here from deleted former Section C405.2.1.1.

Proposed Exception 3 to Section C405.2:

"Emergency egress lighting that is normally off" does not seem to be exempt from controls requirements in the current code, but it needs to be.

Section C405.2.1.1:

This proposal deletes existing Section C405.2.1.1 and replaces it with new text. The way the code is currently structured most users probably would not realize that a manual switch is always required, even with automatic-on occupant sensors. This clarifies the fact that a manual switch is always required.

Exception to Proposed Section C405.1.1:

Former Section C405.2.2 is proposed to be moved and split into two sections: Sections C405.2.1 and C405.2.1.1. The requirements under proposed new Section C405.2.1.1 have been itemized for clarity. Note that the requirement for occupant sensor controls in "other spaces 300 square feet or less" is extremely broad and will encompass all of the lighting on smaller projects. For example, this is applicable to sleeping units, dwelling units, etc. Whether or not this was the original intention, this is how the code currently reads, and this proposal is intended to provide clarity, it is not intended to make technical changes.

Exception 1 to Section C405.2.2:

Note that the current code does not offer an exception for dwelling units. Dwelling units that are not exempt from all of 405.2 are required to comply with the requirements for automatic controls and light reduction controls.

Exception 4 to Section C405.2.2:

The exception that is currently in the code is for "lighting" that is intended for continuous operation, not for "spaces". This is an important distinction, because it allows light fixtures that are intended for night lighting of unoccupied spaces to be left off the automatic control system (like retail stores for security reasons, where select lights might be left on all night long.

The current code does not offer a blanket exemption for continuously operational emergency egress "night" lighting. Under current code, all emergency egress lighting that is not located in a corridor or stairwell must have a manual control device for override, even though it does not need to be automatically controlled.

Exception 2 to Section C405.2.1 and Section C405.2.1.2:

This exception is derived from 2012 IECC Section C405.2.1.2, which this proposal deletes. Storerooms and restrooms should not be in this list because they are required to be provided with occupant sensor controls.

Sections C405.2.1.1, C405.2.2.1 and C405.2.2.3:

This new section is a combination of the requirements in existing Sections C405.2.1.1 and C405.2.2.1 that pertain to manual controls. Therefore, existing Section C405.2.1.1 is proposed to be deleted and Section C405.2.2.1 is proposed to be revised. Existing Section C405.2.2.3 is not replaced, it is renumbered, as are all affected subsequent sections.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

C405.2-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The lighting control section needed to be reorganized into a more logical format. The rearrangement will eliminate much confusion.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4, and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted;
2. Emergency egress lighting that is normally off; and
~~2. Stairways and corridors; and~~
3. Interior exit stairways, interior exit ramps, and exit passageways.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The current exception in the code makes no sense. Why should lighting in a corridor, which is an exit access component, be exempt from the controls requirements in this code while lighting in an exit passageway is not?

This proposal would conform imprecise language in the IECC with the IBC, resulting in more consistent interpretation and enforcement of the code. It would also avoid potential conflicts between lighting controls requirements in this code and lighting requirements for luminous egress path markings in exits in Section 1024 of the IBC.

Public Comment 2:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.1 Occupant sensor controls. *Occupant sensor controls* shall be installed to control lights in the following space types:

1. Classroom~~s~~/lecture/training rooms,
2. Conference/meeting ~~rooms~~/multi-purpose rooms,
3. Copy/print rooms,
4. Lounges,
5. Employee lunch and break rooms,
6. Private offices,
7. Restrooms,
8. Storage rooms, ~~and~~
9. Janitorial closets,
10. Locker rooms,
11. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The purpose of Proposal CE287 is to add clarity to the lighting controls requirements in the code. This comment further revises the paragraph that stipulates where occupant sensor controls must be used. The phrase "to control lights" is added to make it clear that the sensors not only have to be installed, but have to function. For clarity, the space types are presented as a list. Also for clarity, the space type names are revised to be consistent with the space type names used for determination of lighting power density. This comment also requires the use of occupancy sensors in certain additional space types where occupancy sensors can be used effectively.

CE287-13

Final Action: AS AM AMPC____ D

CE289-13
C405.2.1.1

Proposed Change as Submitted

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C405.2.1.1 Interior lighting controls. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.

Exceptions:

1. Areas designated as security or emergency areas that need to be continuously lighted.
2. Lighting in stairways or corridors that are exits or exit discharge elements~~ of the means of egress~~.

Reason: According to the IBC 2012, all interior stairways and corridors are elements of the means of egress (most are exit access components). This makes the current code language redundant and confusing.

Most users of the code interpret this exception to apply only to stairways and corridors that are part of exits, and this was probably the original intention of the language. Interior exit discharge elements are unusual, but are allowed by IBC 2012 Section 1027.1.

The proposed change will make this section of the code technically correct and consistent with other ICC family codes.

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

C405.2.1.1-EC-BAILEY.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The revision clarifies the exception. It aligns with the terms as defined in the *International Building Code.*

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

J. William Degnan, President, National Association of State Fire Marshals, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.1.1 Interior lighting controls. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.

Exceptions:

1. Areas designated as security or emergency areas that need to be continuously lighted.

2. Lighting in stairways or corridors that are ~~exits or exit discharge~~ elements of the means of egress meeting the requirements of the *International Building Code*.

Commenter's Reason: The change that the committee approved as submitted removed other components of a Means of Egress from the exception without proper technical justification. Both Corridors and stairways may be part of a MOE but not an exit or exit discharge. The original language actually is better. Adding conformance with the IBC would add the necessary clarification.

Public Comment 2:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Disapproval.

Commenter's Reason: The text of the approved CE289 will set up a conflict between the IECC and the IBC. Means of egress is the term representing the whole egress system consisting of three parts: Exit access, exits and exit discharge. The 2012 code only addresses stairways and corridors in the means of egress system. And this section of the code only addresses interior lighting. While there are some exceptions that allow exit discharge within a building, most exit discharge is exterior and not regulated by this provision of the IECC. CE287 which was also approved eliminated the text of "means of egress' and would provide the exception for all stairways. CE287 is consistent with the current code. CE289 adds the qualify that it is only stairways and corridors in exits and exit discharge. Corridors are only located in exit access. If CE289 is allowed to remain approve it actually eliminates the application of this exception to all corridors and will eliminate its use for stairways also located in the exit access portion of the system. The current code is correct as will be the code if CE287 is allowed to stand. The IECC will be inconsistent with the IBC if CE289 remains approved.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

CE289-13

Final Action: AS AM AMPC____ D

CE292-13
C405.2.2.2

Proposed Change as Submitted

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.2 Occupancy sensors. Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, <u>warehouse spaces</u>, storage rooms and janitorial closets, and other spaces 300 square feet (28 m^2) or less enclosed by floor-to-ceiling height partitions. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

> **Exception:** Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants

Reason: This provision adds warehouses to the list of areas requiring occupancy sensors for lighting control. Since most areas in a warehouse are unoccupied most of the time, while other spaces are in use, the savings on lighting energy are substantial. This has been an integral part of the Washington State Energy Code for many years.

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

C405.2.2.2-EC-NOGLER.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned about the potential safety issues of having lights turn off automatically in a warehouse. The committee suggested working with proponent of CE293-13 to develop a coordinated public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Nogler, Washington State Building Code Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.2.2 Occupancy sensors. Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, ~~warehouse spaces~~, storage rooms and janitorial closets, and other spaces 300 square feet (28 m^2) or less enclosed by floor-to-ceiling height partitions.<u>.</u> ~~These~~ <u>The</u> automatic control devices <u>in these spaces</u> shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power. <u>In aisle ways and open areas in warehouses, lighting shall be controlled with occupancy sensors that automatically reduce lighting power by at least 50 percent when the areas are unoccupied. The occupancy sensors in warehouses shall control lighting in each aisle way independently, and shall not control lighting beyond the aisle way being controlled by the sensor</u>.

Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, warehouses, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

Commenter's Reason: The committee asked that the proponents of this proposal CE292 and the related proposal CE293 coordinate to provide a combined Public Comment to address lighting energy conservation in warehouses. This Comment addresses the safety concerns expressed at the Dallas hearing by requiring only a 50% lighting power reduction after 30 minutes of inactivity, rather than a full-off control, and by limiting the controlled areas to aisles and open spaces only. The proposed language is adapted from the California Title 24 code.

CE292-13

Final Action: AS AM AMPC____ D

CE293-13
C405.2.2.2, C405.2.2.2.1 (New), C405.2.2.2.2 (New)

Proposed Change as Submitted

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, (glenn@lampartners.com). James Edelson, New Buildings Institute.

Revise as follows:

C405.2.2.2 Occupancy sensor~~s~~ controls. Occupancy sensors shall be installed to control lights in accordance with C405.2.2.2.1 and C405.2.2.2.2. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual-on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

Exception: Full automatic-on controls shall be permitted to control lighting in:

1. Public corridors,
2. Stairways,
3. Restrooms,
4. Primary building entrance areas and lobbies,
5. Parking garages,
6. Warehouses,
7. Areas where manual-on operation would endanger the safety or security of the room or building occupants.

C405.2.2.2.1. Occupancy sensors for 100 percent load control. Occupancy sensors shall be installed to control 100 percent of the connected lighting load in:

1. Classroom~~s~~/lecture/training rooms,
2. Conference/meeting ~~rooms~~/multi-purpose rooms,
3. Copy/print rooms,
4. Lounges,
5. Employee lunch and-break rooms,
6. Private offices,
7. Restrooms,
8. Storage rooms, ~~and~~
9. Janitorial closets,
10. Laboratory classrooms,
11. Locker rooms,
12. Other spaces 300 square feet (28 m^2) or less enclosed by floor-to-ceiling height partitions.

C405.2.2.2.2. Occupancy sensors for 50 percent load control. Occupancy sensors shall be installed to control not less than 50 percent of the connected lighting load in:

1. Enclosed stairways,
2. Parking garages,
3. Warehouses.

Reason: Occupancy sensors are the automatic control type that leads to the most energy savings. This proposal requires the use of occupancy sensors in certain additional space types where occupancy sensors can be used effectively. The space type names are consistent with the space type names used for determination of lighting power density. The phrase “to control lights” is added to make it clear that the sensors not only have to be installed, but have to function. The section has been reformatted in list format for clarity.

Cost Impact: This code change proposal will increase the cost of construction if occupancy sensors would not already be specified for the space types not currently in the code.

C405.2.2.2-EC-HEINMILER.doc

Public Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt that previous proposals addressed these issues in a better way and perhaps this proponent could work some of these ideas through those items. There was also concern that a reduction of lighting to 50% within enclosed stairways could result in something below minimum illumination required by the *International Building Code.*

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.2.2 Occupancy sensor controls. Occupancy sensors shall be installed in the following areas and spaces ~~to control lights in accordance with C405.2.2.2.1 and C405.2.2.2.2. These automatic control devices shall be installed~~ to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual-on or shall be controlled to automatically turn the lighting on to not more than 50 percent power~~.~~

~~**C405.2.2.2.1. Occupancy Sensors for 100% load control.** Occupancy sensors shall be installed to control 100 percent of the connected lighting load in:~~

1. Classroom~~s~~/lecture/training rooms,
2. Conference/meeting ~~rooms~~/multi-purpose rooms,
3. Copy/print rooms,
4. Lounges,
5. Employee lunch and break rooms,
6. Private offices,
7. Restrooms,
8. Storage rooms, and
9. Janitorial closets,

~~10. Laboratory classrooms,~~

10. Locker rooms,
11. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.

Exception: Full automatic-on controls shall be permitted to control lighting in:

1. Public corridors,
2. Stairways,
3. Restrooms,
4. Primary building entrance areas and lobbies,

~~5. Parking garages,~~
~~6. Warehouses,~~

5 ~~7~~ Areas where manual-on operation would endanger the safety or security of the room or building occupants.

~~**C405.2.2.2.2. Occupancy Sensors for at least 50% load control.** Occupancy sensors shall be installed to control at least 50 percent of the connected lighting load in:~~

~~1 Enclosed stairways,~~
~~2. Parking garages,~~
~~3. Warehouses.~~

Commenter's Reason: CE293 was disapproved in Dallas for extending the mandatory use of occupancy sensors to some specific types. This Public Comment removes those space types (warehouses, parking garages, enclosed stairways, laboratory classrooms).

CE293-13

Final Action: AS AM AMPC____ D

CE294-13

C202, Figure C405.1 (NEW), Figure C405.2 (NEW), C405.2.2.3, C405.2.2.3.1 (NEW), C405.2.2.3.2 (NEW), C405.2.2.3.3 (NEW), Figure C405.3 (NEW), Figure C405.4 (NEW)

Proposed Change as Submitted

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com), Jim Edelson, New Buildings Institute (jim@newbuildings.org)

Revise as follows:

~~**C405.2.2.3 Daylight zone control.** Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with either Section C405.2.2.3.1 or Section C405.2.2.3.2. Each daylight control zone shall not exceed 2,500 square feet (232 m^2). Contiguous daylight zones adjacent to vertical fenestration are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration.~~

> ~~**Exception:** Daylight zones enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.~~

C405.2.2.3 Daylight responsive controls. *Daylight responsive controls* complying with Section C405.2.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section C405.2.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.3.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section C405.2.2.3.3.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.3.

C405.2.2.3.1 Daylight responsive control function. Where required, *daylight responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplight *daylight zones* in accordance with Section C405.2.2.3.3 shall be controlled independently of lights in sidelight *daylight zones* in accordance with Section C405.2.2.3.2;
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel;
3. Calibration mechanisms shall be *readily accessible*;
4. When located in offices, classrooms, laboratories, and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 10 percent of full light output or lower;
5. *Daylight responsive controls* shall be capable of a complete shut off of all controlled lights; and
6. Lights in sidelight *daylight zones* in accordance with Section C405.2.2.3.2 facing different cardinal orientations (i.e. within 45 degrees of due north, east, south, west) shall be controlled independently of each other.

Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

C405.2.2.3.2 Sidelight daylight zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which complies with all of the following:

1. Where the *fenestration* is located in a wall, the *daylight zone* shall extend laterally to the nearest full height wall, or up to 1.0 times the height from the floor to the top of the *fenestration*, and longitudinally from the edge of the fenestration to the nearest full height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.1;
2. Where the *fenestration* is located in a rooftop monitor, the *daylight zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C405.2 and C405.3;
3. The area of the *fenestration* is at least 24 square feet;
4. The distance from the *fenestration* to any building or geological formation which would block access to daylight is greater than the height from the bottom of the *fenestration* to the top of the building or geologic formation; and
5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is no less than 0.25.

C405.2.2.3.3 Toplight daylight zone. The toplight *daylight zone* is the floor area underneath a roof *fenestration* assembly which complies with all of the following:

1. The *daylight zone* shall extend laterally and longitudinally beyond the edge of the roof *fenestration* assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C405.4;
2. No building or geological formation blocks direct sunlight from hitting the roof *fenestration* assembly at the peak solar angle on the summer solstice; and
3. Where located in existing buildings, the product of the *visible transmittance* of the roof *fenestration* assembly and the area of the rough opening of the roof fenestration assembly, divided by the area of the daylight zone is no less than 0.008.

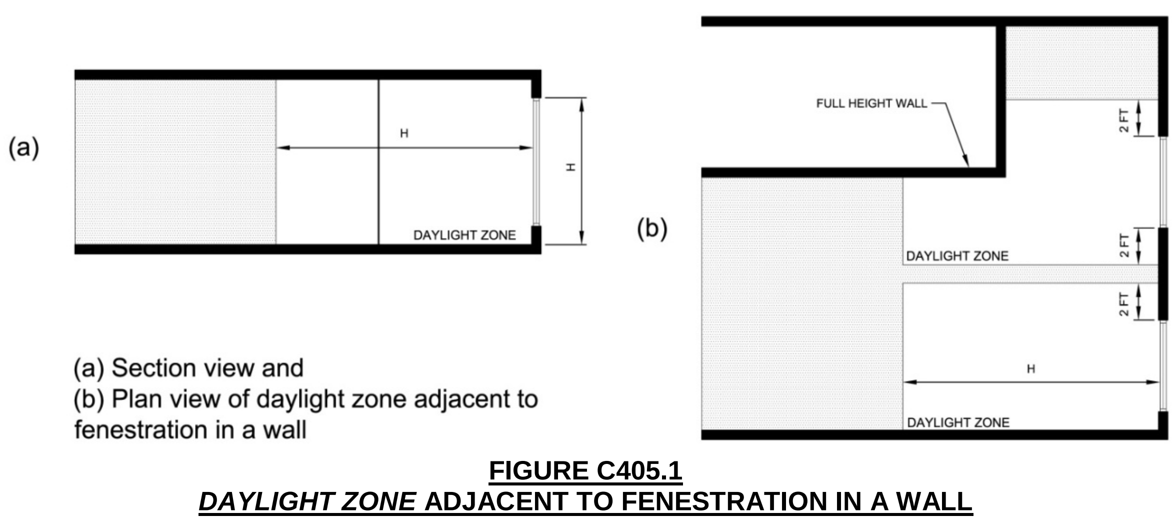
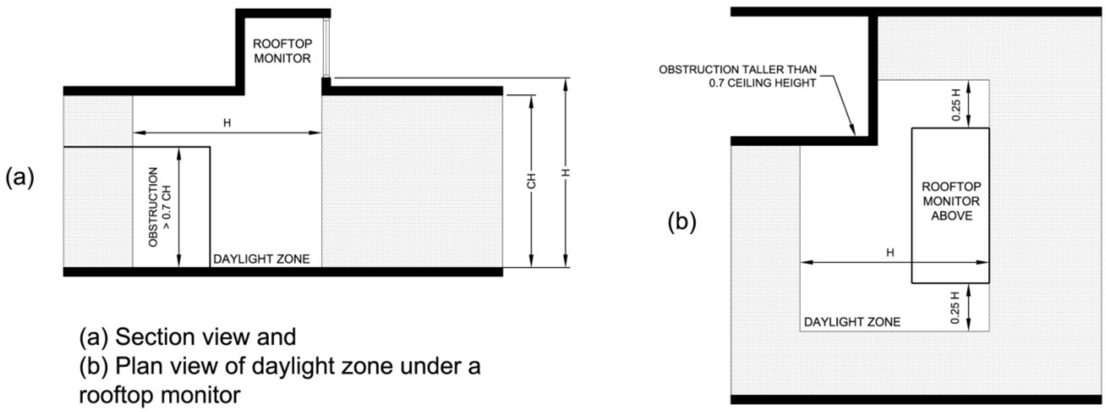
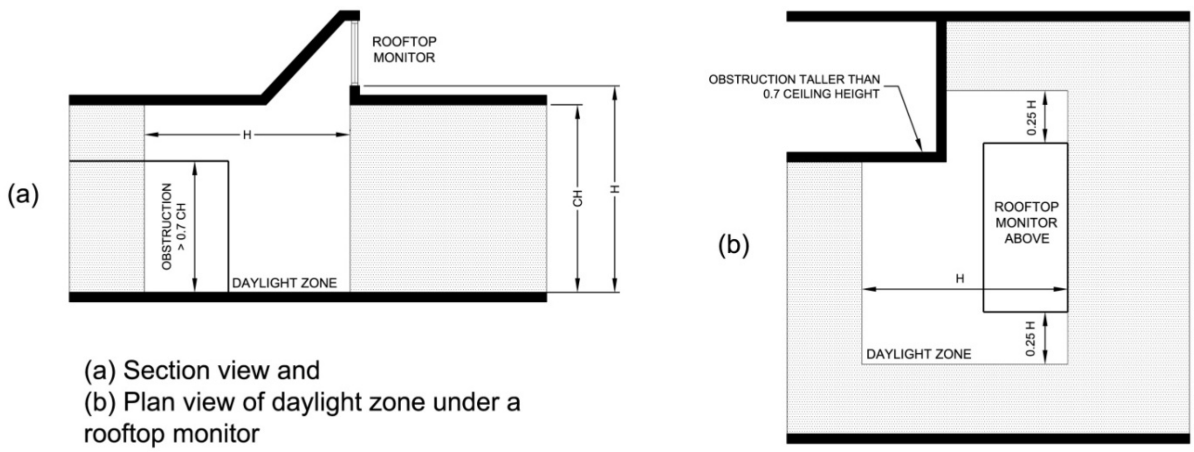


FIGURE C405.1
***DAYLIGHT ZONE* ADJACENT TO FENESTRATION IN A WALL**



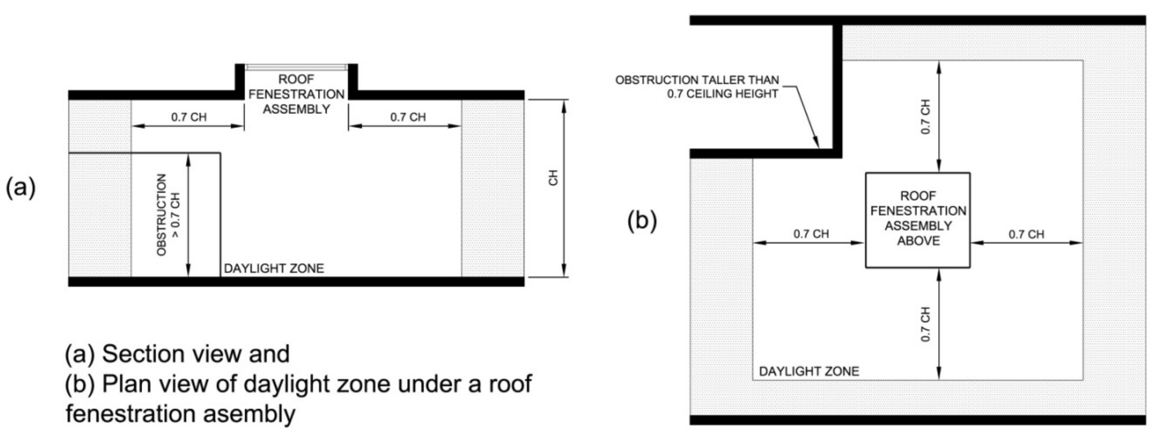
(a) Section view and
(b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.2
DAYLIGHT ZONE **UNDER A ROOFTOP MONITOR**



(a) Section view and
(b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.3
DAYLIGHT ZONE **UNDER A SLOPED ROOFTOP MONITOR**



(a) Section view and
(b) Plan view of daylight zone under a roof fenestration asembly

FIGURE C405.4
DAYLIGHT ZONE **UNDER A ROOF FENESTRATION ASSEMBLY**

Revise definitions as follows:

SECTION C202
GENERAL DEFINITIONS

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. That portion of a building's interior floor area that is illuminated by natural light.

1. ~~**Under skylights.** The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.~~
2. ~~**Adjacent to vertical fenestration.** The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the daylight *zone* depth is assumed to extend into the space a distance of 15 feet (4572 mm) or to the nearest ceiling height opaque partition, whichever is less. The daylight *zone* width is assumed to be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.~~

Reason: This proposal would replace the provisions in the code related to control of electric lights in daylight zones. It would not alter any of the envelope provisions in the code, nor would it set any minimum requirements for fenestration. The proposed changes are needed for two reasons:

1. The existing IECC code language is technically inadequate and confusing, and
2. There is a tremendous untapped potential for energy savings in buildings just by turning off electric lights in daylit spaces.

Inadequate and Confusing Language in 2012 IECC

1. The code describes all sidelight daylight zones as being 15 feet deep, regardless of whether the window is 5 feet high or 50 feet high. Lighting controls will not function properly if the daylight zone size is wrong, and the 15 foot depth requirement in the current code is actually an impediment to successful implementation of daylight responsive controls. New definitions that are based on the geometry of the building are proposed, and diagrams are provided to make the code easier to use. The proposed diagrams are modified slightly from the diagrams published in the 2012 IGCC, and if this proposal is approved these modifications should be proposed for the IGCC diagrams as well.
2. The code provides no clear guidance about the daylight zone associated with a rooftop monitor. This proposal clearly describes the daylight zone associated with rooftop monitors.
3. Small windows, windows with low-VT glass, and windows which are overshadowed by adjacent buildings are common in urban areas with older building stock. Daylight responsive controls should not be required in situations where they will be ineffective. The current code does not provide exceptions for these situations, but the proposed language does.
4. The code requires that separate control be provided for lights in each daylight zone. On facades where windows are spaced more than 4 feet apart, each window establishes a separate daylight zone, and hence a separate lighting control zone. This adds unnecessary cost and complexity to the lighting controls. The proposed daylight responsive control requirements in Section 405.2.2.3.1 resolve this issue and clarify which lights can be grouped together for control in a more sensible way.
5. The code allows step-switching in offices, laboratories, classrooms, and reading rooms, where we know this is objectionable to occupants. This proposal would require dimming in those areas, while still allowing less costly switching systems to be used in other areas.
6. The code is not specific enough about how daylight responsive controls should be required to function. An owner, developer, designer, or builder who looks for the lowest first-cost solution that meets the current code will likely end up with a lighting control system that doesn't work. The proposed Section 405.2.2.3.1 would establish minimum requirements for these systems to function properly. The code is not a design guideline, but it should prevent obvious shortcuts which subvert the intent of the code.

Additional Energy Savings from Daylight Responsive Controls

The IECC requires that daylight responsive controls only be provided in buildings following the prescriptive path which fail to meet certain fenestration requirements. This is obviously a very limited requirement, as most lighting installations are completed as part of alterations to existing buildings that do not include envelope alterations.

This proposal would require that daylight responsive controls be provided whenever more than 150 watts of lighting is installed in an area which receives effective daylight. Necessary exceptions are included for lighting in dwelling units, sleeping units, health care, etc. The 150 watt threshold was found to be cost effective by PNNL and HMG in research done to support the ASHRAE 90.1 Committee. If approved, this proposal would align the stringency of the lighting control requirements in the IECC with those of ASHRAE / ANSI / IESNA Standard 90.1 – 2013, but would still leave the IECC less stringent than California Title 24 – 2013.

Lighting in commercial buildings is responsible for 38% of electricity consumption in commercial buildings nationally. As a portion total energy use, lighting is the largest individual use of energy, accounting for one fifth (20%) of the combined energy total. This occurs despite the fact that many buildings have ample access to a free light source – daylight. A recent meta-analysis report on lighting controls in commercial buildings (Lighting Controls in Commercial Buildings, Williams, Atkins et al, 2012) estimated a 28% average lighting energy savings potential for buildings that incorporated daylighting strategies.

Guidelines published by NBI (http://patternguide.advancedbuildings.net) show that there are multiple ways to provide high quality daylight in most buildings. In addition to many energy code entities, almost every voluntary rating system has been increasing their reliance on daylighting to reduce energy consumption in commercial buildings. This proposal ensures that the IECC incorporates the energy saving priority that if sufficient daylight is available, then controls should be included to turn off the electric lights.

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

C405.2.2.3 (NEW)-EC-BAILEY-EDELSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Daylight zones are already required and must be shown on the construction documents. This proposal clarifies the appropriate controls for each type of daylight space.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers; Jim Edelson, New Buildings Institute, Glenn Heinmiller, Lam Partners, representing self, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.2.3 Daylight Responsive Controls. *Daylight responsive controls* complying with Section C405.2.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with C405.2.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with C405.2.3.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with C405.2.2.3.3.

Exceptions:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with C405.2.3.
4. <u>Sidelight *daylight zones* on the first floor above grade in Group A-2 and Group M occupancies.</u>

C405.2.2.3.1 Daylight responsive control function. Where required, *daylight responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

4. Where located in offices, classrooms, laboratories, and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to ~~10~~ <u>15</u> percent of full light output or lower

C405.2.2.3.2 Sidelight Daylight Zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which satisfies the following criteria:

5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is no less than ~~0.25~~ <u>0.20</u>.

(Portions of proposal not shown remain unchanged)

Commenter's Reason:
Bailey/Edelson: The sponsors of CE294 have worked with a group of interested parties to offer one consolidated public comment with several proposed revisions:

1. Add an exception for restaurants, bars, and retailers who often want to leave lights on during the day in their street level storefronts to draw attention to their establishment, and to convey to passersby that they are open for business. This seems like a reasonable exception, and Seattle already has a similar provision in place in their code.
2. Relax the requirement for lights in offices, classrooms, laboratories, and library reading rooms to dim to 10%. Changing this requirement to 15% will allow a much wider variety of lighting products to be used.
3. Reduce the VT exception for fenestration in existing buildings from 0.25 to 0.20. This will make daylight responsive controls more widely applicable in existing buildings, and will also discourage the use of lower transmittance fenestration in new construction. In many cases, permits for new construction do not include interior fitout, and interior fitout is subsequently filed as an alteration to the new building. When this happens, daylight controls will not be required if low VT fenestration is used. This creates a perverse incentive for the designers of the new building to select a lower transmittance fenestration assembly to avoid the requirement for daylight responsive controls inside the building. Lowering the threshold for this exception will make it less likely that this will happen, as most designers would not select fenestration with a VT lower than 0.20 for aesthetic reasons.

Heinmiller: This public comment incorporates three separate changes to the original proposal:

1. Add an exception for restaurants, bars, and retailers who often want to leave lights on during the day in their street level storefronts to draw attention to their establishment, and to convey to passersby that they are open for business. This seems like a reasonable exception, and Seattle already has a similar provision in place in their code.
2. Relax the requirement for lights in offices, classrooms, laboratories, and library reading rooms to dim to 10%. Changing this requirement to 15% will allow a much wider variety of lighting products to be used.
3. Reduce the VT exception for fenestration in existing buildings from 0.25 to 0.20. This will make daylight responsive controls more widely applicable in existing buildings, and will also discourage the use of lower transmittance fenestration in new construction. In many cases, permits for new construction do not include interior fitout, and interior fitout is subsequently filed as an alteration to the new building. When this happens, daylight controls will not be required if low VT fenestration is used. This creates a perverse incentive for the designers of the new building to select a lower transmittance fenestration assembly to avoid the requirement for daylight responsive controls inside the building. Lowering the threshold for this exception will make it less likely that this will happen, as most designers would not select fenestration with a VT lower than 0.20 for aesthetic reasons.

Public Comment 2:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers; Jim Edelson, New Buildings Institute, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**C405.2.2.3.1 Manual daylighting controls.** Manual controls shall be installed in daylight zones unless automatic controls are installed in accordance with Section C405.2.3.5.~~

~~**C405.2.2.3.2 Automatic daylighting controls.** Set-point and other controls for calibrating the lighting control device shall be readily accessible.~~

~~Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:~~

~~1. Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylit zone continuously to less than 35 percent of rated power at maximum light output.~~
~~2. Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power.~~

~~**C405.2.2.3.3 Multi-level lighting controls.** Where multi-level lighting controls are required by this code, the general lighting in the daylight zone shall be separately controlled by at least one multi-level lighting control that reduces the lighting power in response to daylight available in the space. Where the daylit illuminance in the space is greater than the rated illuminance of the general lighting of daylight zones, the general lighting shall be automatically controlled so that its power draw is no greater than 35 percent of its rated power. The multi-level lighting control shall be located so that calibration and set point adjustment controls are readily accessible and separate from the light sensor.~~

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. Automatic daylighting controls specified by this section shall comply with Section ~~C405.2.2.3.2~~ C405.2.2.3.1

C402.3.2.1 Lighting controls in daylight zones under skylights. All lighting in the daylight zone shall be controlled by multilevel lighting controls that comply with Section ~~C405.2.2.3.3.~~ C405.2.2.3.1.

Exceptions (Remain unchanged.)

Commenter's Reason: This public comment eliminates superseded code subsections that are redundant and confusing.
CE294 was intended to completely replace existing provisions in the IECC related to daylight controls in Section C405.2.2.3 **and all of its subsections**. However, due to a misunderstanding of ICC procedures by the sponsors, CE294 as approved would only delete section C405.2.2.3, but subsections C405.2.2.3.1, C405.2.2.3.2, and C405.2.2.3.3 would remain in the code.
This public comment corrects that error. If the language remains in the IECC there will be two separate sets of requirements for daylight responsive controls – one for controls required by the envelope section C402, and a second for controls required by the lighting section C405.

Public Comment 3:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**C405.2.2.3.1 Manual daylighting controls.** Manual controls shall be installed in daylight zones unless automatic controls are installed in accordance with Section C405.2.3.5.~~

~~**C405.2.2.3.2 Automatic daylighting controls.** Set-point and other controls for calibrating the lighting control device shall be readily accessible.~~

~~Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:~~

1. ~~Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylit zone continuously to less than 35 percent of rated power at maximum light output.~~
2. ~~Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power.~~

~~**C405.2.2.3.3 Multi-level lighting controls.** Where multi-level lighting controls are required by this code, the general lighting in the daylight zone shall be separately controlled by at least one multi-level lighting control that reduces the lighting power in response to daylight available in the space. Where the daylit illuminance in the space is greater than the rated illuminance of the general lighting of daylight zones, the general lighting shall be automatically controlled so that its power draw is no greater than 35 percent of its rated power. The multi-level lighting control shall be located so that calibration and set point adjustment controls are readily accessible and separate from the light sensor.~~

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting~~ Daylight responsive controls specified by this section shall comply with Section ~~C405.2.2.3.3.~~ C405.2.2.3

C402.3.2.1 Lighting controls in daylight zones under skylights. All lighting in the daylight zone shall be controlled by ~~multilevel lighting~~ daylight responsive controls that comply with Section ~~C405.2.2.3.3.~~ C405.2.2.3

Exceptions (Remain unchanged.)

(The remainder of the proposal is not modified.)

Commenter's Reason: This public comment deletes unnecessary language from the code. If CE294 is approved, the sections proposed for deletion above would then remain in the code, but would not be referenced by any other sections. This would be confusing for users of the code.

CE294-13

Final Action:	AS	AM	AMPC____	D

CE299-13
C405.2.3

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device ~~at the main room entry that controls all permanently installed luminaires and switched receptacles~~ that is capable of switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

Reason: For consistency with ASHRAE/IES 90.1. These revisions introduce automatic lighting control to guestroom type spaces for additional energy savings and allow captive key systems that provide similar savings control to also comply.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

C405.2.3-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

3. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

(Balance of the proposal is unchanged.)

Committee Reason: The modification was approved to correct the readability of the sentence. The turning off of power when sleeping units are occupied will save significant energy.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device that ~~is capable of~~ automatically ~~switching~~ <u>switches</u> off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

Commenter's Reason: A manual switch is **capable** of switching lights off within 20 minutes of all occupants leaving the room if the occupants use the switch to turn the lights off when they walk out.

It is essential that the term "automatic" included in this proposal so that it achieves the intended result.

CE299-13

Final Action: AS AM AMPC____ D

CE302-13
C405.2.3

Proposed Change as Submitted

Proponent: Duane Jonlin, City of Seattle, representing City of Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
7. Each stairway shall have one or more control devices to automatically reduce lighting power by not less than 50 percent when no occupants have been detected in the stairway for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter the stairway. All portions of stairways shall remain illuminated to at least 1 footcandle (11 lux) at the walking surface when the lighting power is reduced.
8. Lighting in parking garages shall have one or more control devices to automatically reduce lighting power in any one controlled zone by not less than 50 percent when no occupants have been detected in that zone for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter or approach the zone. Each lighting zone controlled by occupancy sensors shall be no larger than 7,200 square feet. Pedestrian occupancy sensors controlling any lighting zone are permitted to be configured to detect pedestrians no more than 30 feet outside of that zone. Vehicle occupancy sensors controlling any lighting zone are permitted to be configured to detect vehicles no more than 60 feet outside of that zone.

Reason: This provision allows stairs enclosures and parking garages lighting energy use to be reduced by half when unoccupied, then come back to full brightness when occupants enter those spaces. It provides a balance between safety, security and energy use. These measures are currently in force in Seattle.

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

C405.2.3-EC-JONLIN.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that there may be unintended consequences from the proposed language. Item 8 didn't have a minimum amount of light. The committee expressed concern about a scenario where one might happen to be sitting in a car in a parking garage while waiting for someone else to show up. The lights could go out leaving the occupant in the dark.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
7. Each stairway shall have one or more control devices to automatically reduce lighting power by not less than 50 percent when no occupants have been detected in the stairway for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter the stairway. All portions of stairways shall remain illuminated to the level required by Section 1006.2 of the *International Building Code* when the lighting power is reduced.
8. Lighting in parking garages shall have one or more control devices to automatically reduce lighting power in any one controlled zone by not less than 50 percent <u>and not more than 75 percent</u> when no occupants have been detected in that zone for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter or approach the zone. Each lighting zone controlled by occupancy sensors shall be no larger than 7,200 square feet. Pedestrian occupancy sensors controlling any lighting zone are permitted to be configured to detect pedestrians no more than 30 feet outside of that zone. Vehicle occupancy sensors controlling any lighting zone are permitted to be configured to detect vehicles no more than 60 feet outside of that zone. <u>Lighting for covered vehicle entrances to and exits from the garage shall be separately controlled and comply with Section C405.2.4. Lighting is permitted to be turned off completely during hours when the garage not in operation.</u>

Commenter's Reason: The original code change proposal adds items #7 for stairways and #8 for parking garages. This Public Comment responds to the Committee's concern that no minimum garage lighting level had been specified. In addition, garage entrance and exit lighting is exempted from the requirement.

Public Comment 2:

Andrei Moldoveanu, representing The National Electrical Manufacturers Association (NEMA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
7. Each stairway shall have one or more control devices to automatically reduce lighting power by not less than 50 percent when no occupants have been detected in the stairway for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter the stairway. All portions of stairways shall remain illuminated to at least 1 footcandle (11 lux) at the walking surface when the lighting power is reduced.
8. ~~Lighting in parking garages shall have one or more control devices to automatically reduce lighting power in any one controlled zone by not less than 50 percent when no occupants have been detected in that zone for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter or approach the zone. Each lighting zone controlled by occupancy sensors shall be no larger than 7,200 square feet. Pedestrian occupancy sensors controlling any lighting zone are permitted to be configured to detect pedestrians no more than 30 feet outside of that zone. Vehicle occupancy sensors controlling any lighting zone are permitted to be configured to detect vehicles no more than 60 feet outside of that zone.~~

Commenter's Reason: The Committee rejected the original proposal because "item 8 didn't have a minimum amount of light". Also, "the lighting could go out [in parking garages] leaving occupants in the dark". The committee did not appear to have an issue with item 7. This modification eliminates item 8 thereby removing the committee's objections.

CE302-13

Final Action: AS AM AMPC____ D

CE303-13
C405.2.4

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Delete and substitute as follows:

~~**C405.2.4 Exterior lighting controls.** Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.~~

C405.2.4 Exterior lighting controls. Exterior lighting shall be controlled by either an astronomical time switch or a photo sensor and a time switch. Time switches shall be capable of retaining programming and the time setting for at least 10 hours without power.

> **Exception:** Lighting designed for dusk to dawn operation shall be permitted to have a photo sensor without a time switch.

Reason: This proposal simplifies the provisions covering exterior lighting controls in the code, to foster the ability to implement and verify compliance with the code.

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

C405.2.4 (NEW)-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Clarifies the text of the section. There are no technical changes resulting from the revision.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.4 Exterior lighting controls. All exterior lighting shall be ~~controlled by either an astronomical time switch or a photo sensor and a time switch~~. provided with a control that automatically turns off the lighting when daylighting is available.

Where lighting the building façade or landscape, the lighting shall also be provided with controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.

Exterior lighting other than building façade or landscape lighting shall be provided with controls configured to automatically reduce the connected lighting power by at least 30 percent from 12 midnight or within one hour of the end of business operations, whichever is later until 6 a.m. or business opening whichever is earlier or during any period when no activity has been detected for a time of no longer than 15 minutes.

All ~~time switches~~ controls that operate as a function of time shall be capable of retaining programming and the time setting during a loss of power of at least 10 hours.

Exceptions:

1. ~~Lighting designed for dusk to dawn operation shall be permitted to have a photo sensor without a time switch.~~
1. Emergency lighting that is intended to be automatically off during building operation.
2. Lighting specifically required to satisfy health and life safety requirements.
3. Decorative gas lighting systems
4. Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.

Commenter's Reason: At the code development hearing, both CE303-13 and CE304-13 were approved as submitted. The intent of CE303-13 was to simplify the provisions in the code covering exterior lighting controls and in so doing foster the ability to implement the code and to verify compliance with the code. The language approved pursuant to CE304-13, which is intended to foster consistency between the IECC and ANSI/ASHRAE/IESNA Standard 90.1-13, is as follows:

C405.2.4 Exterior lighting controls. *Lighting for exterior applications other than emergency lighting that is intended to be automatically off during building operation, lighting specifically required to meet health and life safety requirements or decorative gas lighting systems shall:*

1. *Be provided with a control that automatically turns off the lighting as a function of available daylight.*
2. *Where lighting the building façade or landscape the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.*
3. *Where not covered in Item 2 the lighting shall have controls configured to automatically reduce the connected lighting power by at least 30 percent from no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening or during any period when no activity has been detected for a time of no longer than 15 minutes.*

All time switches shall be able to retain programming and the time setting during loss of power for a period of at least ten hours.

Exception: *Lighting for covered vehicle entrances or exits from buildings or parking structures* where required for safety, security, or eye adaptation.

The approval of both CE303-13 and CE304-13 would provide a challenge in reconciling the text approved in both changes. In all likelihood the approved text in CE303-13 would be overshadowed and more or less eliminated by the text approved in CE304-13. As a result, the simplicity and clarification intended in CE303-13 would be lost. The intent of this public comment is to reconcile the provisions in CE303-13 and CE304-13 in a way that addresses both the simplicity and clarity intended in CE303-13, and the technical improvement and consistency with ANSI/ASHRAE/IESNA Standard 90.1-13 intended CE304-13. This public comment allows the voting members of ICC to review and vote on how these two approved changes would be reconciled and appear in the 2015 IECC.

Two comments were received on DOE's draft public comment; the first made suggestions to the code language in the public comment to reconcile CE303 and CE304, and the second recommended the deletion of the exception for decorative gas lighting.

Since CE304 excepted decorative gas lighting, which is consistent with Standard 90.1 (Section 9.1.1), and both CE303 and CE304 were recommended for approval at the first hearing, and the purpose of this public comment is to simply reconcile what was approved at the first hearing, it did not seem appropriate for DOE to remove that exception.

DOE did revise the public comment based on the suggestions made in the first comment. As such, DOE believes that this public comment reconciles both CE303 and CE304 in a manner acceptable to both proponents, and, since both were recommended for approval at the first hearing, this reconciliation of the text should be acceptable to the ICC membership in voting for approval of CE303 as modified by this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE303-13

Final Action: AS AM AMPC____ D

CE304-13
C405.2.4

<u>Proposed Change as Submitted</u>

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Delete and substitute as follows:

~~**C405.2.4 Exterior lighting controls.** Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours~~

C405.2.4 Exterior lighting controls. <u>Lighting for exterior applications other than emergency lighting that is intended to be automatically off during building operation, lighting specifically required to meet health and life safety requirements or decorative gas lighting systems shall:</u>

1. <u>Be provided with a control that automatically turns off the lighting as a function of available daylight.</u>
2. <u>Where lighting the building façade or landscape the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.</u>
3. <u>Where not covered in Item 2 the lighting shall have controls configured to automatically reduce the connected lighting power by at least 30 percent from no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening or during any period when no activity has been detected for a time of no longer than 15 minutes.</u>

<u>All time switches shall be able to retain programming and the time setting during loss of power for a period of at least ten hours.</u>

> <u>**Exception:** Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.</u>

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 9.4.1.7 of that document contains provisions for exterior lighting controls that differ from those in Section C405.2.4 of the IECC Commercial Provisions. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 this change is needed.

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

C405.2.4-EC-FERGUSON.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the requirements as well as providing 2 additional compliance options. This proposal does leave the lights on, versus completely shutting them off. Many exterior lights are provided for safety purposes and should remain on to a certain level.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Maureen Traxler, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.4 Exterior lighting controls. Lighting for exterior applications ~~other than emergency lighting that is intended to be automatically off during building operation, lighting specifically required to meet health and life safety requirements or decorative gas lighting systems~~ shall:

1. Be provided with a control that automatically turns off the lighting as a function of available daylight.
2. Where lighting the building façade or landscape the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.
3. Where not covered in Item 2 the lighting shall have controls configured to automatically reduce the connected lighting power by at least 30 percent from no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening or during any period when no activity has been detected for a time of no longer than 15 minutes.

   Exception: The following types of lighting are not required to comply with this section:

   1. Emergency lighting that is intended to be automatically off during building operation.
   2. Lighting specifically required to meet health and life safety requirements.
   3. Decorative gas lighting systems.
   4. Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.

All time switches shall be able to retain programming and the time setting during loss of power for a period of at least ten hours.

~~**Exception:** Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.~~

Commenter's Reason: These modifications are intended to be an editorial reorganization of the original proposal. The "other than" phrase in the first sentence contains exceptions which are combined with the exception at the end of the section.

Public Comment 2:

Martha VanGeem, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.4 Exterior lighting controls. Lighting for exterior applications other than emergency lighting that is intended to be automatically off during building operation, lighting specifically required to meet health and life safety requirements or decorative gas lighting systems shall:

1. Be provided with a control that automatically turns off the lighting as a function of available daylight.
2. Where lighting the building façade or landscape the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.
3. Where not covered in Item 2 the lighting shall have controls configured to automatically reduce the connected lighting power by at least 30 percent from no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening or during any period when no activity has been detected for a time of no longer than 15 minutes.

All time switches shall be able to retain programming and the time setting during loss of power for a period of at least ten hours.

Exceptions:

1. Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.
2. Lighting that is integral to signage and installed in the signage by the manufacturer.

Commenter's Reason: In response to industry feedback, an additional exterior lighting control exception will be incorporated into 90.1-2013 in addendum DT. This modification adds an exception for lighting integral to signage. Addendum DT to 90.1-2010 will be incorporated into 90.1-2013, so this also will make the IECC consistent with 90.1-2013.

Public Comment 3:

Craig Conner, Building Quality, representing self; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC; request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

Public Comment 4:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Disapproval.

Commenter's Reason: The Committee approved this proposal because they believed that it "clarifies the requirements". In fact, the opposite is true. This proposal makes the provision confusing by introducing awkward and unclear language and undefined terms. The proposal adds unnecessary complexity.

The Committee approved this proposal because they believed that it is "providing 2 additional compliance options". The proposal does NOT appear to provide any options; it only seems to add new requirements to turn off lights at specific times and amounts depending on the type of lighting.

By requiring that lights be shut off according to "set opening and closing time" and "no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening" the provision is regulating building operations. According to C101.3 of this code the IECC regulates the "design and construction" of buildings. The IECC should not regulate building operations.

Before hearing this proposal, the committee approved proposal CE303. The committee correctly approved proposal CE303 because it "clarifies the text" as desired by the committee. If CE304 is approved it would counteract that clarity, and as noted above, make the provision much more confusing.

Lighting designers who have reviewed this proposal do not understand it, or what they would have to do to comply with it. Code provisions that are vague and confusing can lead to lack of compliance and arguments about interpretation.

Code officials should read this proposal carefully and ask themselves if they understand the language, and if they would be able to verify compliance if necessary.

CE304-13
Final Action: AS AM AMPC____ D

CE306-13
C405.2.5 (NEW)

Proposed Change as Submitted

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C405.2.5 Lighting in refrigerated display cases and walk-in coolers. Lighting in refrigerated display cases, and lights on glass doors installed on walk-in coolers and freezers shall be controlled by one of the following:

1. Automatic time switch controls to turn off lights during non-business hours.
2. Motion sensor controls on each case that reduce display case lighting power by not less than 50 percent within 30 minutes after the area near the case is vacated

Reason: The proposal reduces energy waste by reducing the power level of display lights in refrigerated display cases and glass doors in walk-in coolers during non-business hours and when the nearby area is not in use. Providing automatic controls ensures that lights not in use are automatically reduced in power by at least 50%. Reducing unnecessary lighting of refrigerated areas reduces energy used both for lighting and for the additional cooling load from added heat source. The language for the proposal is adapted from California Title 24-2013.

Cost Impact: The code change proposal will increase the cost of construction but will reduce the overall operating cost of the display case offsetting the first cost of the control.

C405.2.5 (NEW)-EC-MAKELA.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The text would appear to prohibit a single control on multiple cases. The phrase 'near the case' is undefined. People working in non-business hours may need the ability to override to automatic control.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Eric Makela, Britt/Makela Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.5 Lighting in refrigerated display cases and walk-in coolers. Lighting in refrigerated display cases, and lights on glass doors installed on walk-in coolers and freezers shall be controlled by one of the following:

1. ~~Automatic time switch controls to turn off lights during non-business hours.~~ Automatic time switch controls to turn off lights during non-business hours. Timed overrides for display cases or walk-in coolers and freezers shall be used to turn the lights on for up to one hour and shall automatically time out to turn the lights off.

2. ~~Motion sensor controls on each case that reduce display case lighting power by not less than 50 percent within 30 minutes after the area near the case is vacated.~~ Motion sensor controls on each display case or walk-in door section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated.

Commenter's Reason: The IECC Code Development committee voted to disapprove this code change proposal based on three key points:

1. The text would appear to prohibit a single control on multiple cases.
2. The phrase 'near the case' is undefined.
3. People working in non-business hours may need the ability to override to automatic control.

The revised proposal addresses each point by modifying the language accordingly. The code allows either the installation of a motion sensor control on each case or an automatic time switch that could control several cases giving the designer the option to choose either. The language near the case has been deleted. Either the motion sensor is on the case or an automatic time switch can be used that can be located in a remote location. The revised language also requires a timed override for the display case lighting to allow for people working at non-business hours.

The proposal reduces energy waste by reducing the power level of display lights in refrigerated display cases and glass doors in walk-in coolers during non-business hours and when the nearby area is not in use. Providing automatic controls ensures that lights not in use are automatically reduced in power by at least 50%. Reducing unnecessary lighting of refrigerated areas reduces energy used both for lighting and for the additional cooling load from added heat source.

CE306-13

Final Action: AS AM AMPC____ D

CE307-13
C405.2.5 (New)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C405.2.5 Lighting controls in parking garages. Parking garages shall comply with the provisions of Section C405.2.1 and C405.2.2. Lighting shall be provided with controls which are capable of automatically reducing the power supplied to each luminaire by not less than 30 percent after 30 minutes of inactivity in an area not greater than 36,000 square feet. Lighting for covered vehicle entrances to and exits from the garage shall be separately controlled and comply with of Section C405.2.4.

Luminaires within 20 feet of any perimeter wall that has a net opening to wall area ratio of at least 40 open and no exterior obstructions within 20 feet of the wall shall be provided with controls that will automatically adjust the lighting in response to available daylight.

Exceptions: Controls are not required for the following:

1. High-intensity discharge lamps not greater than 150 watts
2. Induction lamps
3. Luminaires that illuminate daylight transitions zones without parking
4. Luminaires that illuminate ramps without parking.
5. Luminaires proximate to exterior walls.

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 9.4.1.3 of that document contains provisions for lighting controls in parking garages and no such provisions exist in the IECC Commercial Provisions. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 this change is needed.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

C405.2.5 (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt the proposed text was unclear and may actually conflict with itself.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.5 Lighting controls in parking garages. Parking garages shall comply with the provisions of Section C405.2.1 and C405.2.2 and the following:

1. Lighting shall be provided with controls which are capable of automatically reducing the power supplied to each luminaire y not less than 30 percent after 30 minutes of inactivity in an area not greater than ~~36000~~ 3600 square feet.
2. Lighting for covered vehicle entrances to and exits from the garage shall be separately controlled and comply with of Section C405.2.4.
3. Luminaires within 20 feet of any perimeter wall that has a net opening to wall area ratio of at least 40 percent open and no exterior obstructions within 20 feet of the wall shall be provided with controls that will automatically adjust the lighting in response to available daylight.

Exceptions: Controls are not required ~~for the following~~ as follows:

1. High-intensity discharge lamps not greater than 150 watts are exempt from Item 2 of Section C405.2.5.
2. Induction lamps are exempt from Item 2 of Section C405.2.5.
3. Luminaires that illuminate daylight transitions zones without parking are exempt from Items 2 and 4 of Section C405.2.5.
4. Luminaires that illuminate ramps without parking. are exempt from Items 2 and 4 of Section C405.2.5.
5. ~~Luminaires proximate to exterior walls.~~

Commenter's Reason: During the Committee Action hearings, this was disapproved because "The committee felt the proposed text was unclear and may actually conflict with itself. "The conflicting language has been removed in this comment which also fixes a couple of small typos.

The proposal is written to only reduce lighting power, not shut off the lighting, when there is no occupancy in the space and the control automatically returns light to full power and output as soon as an occupant enters the space.
The additional changes clarify the actual and realistic exemptions and make the provision more energy effective.

CE307-13

Final Action: AS AM AMPC____ D

CE308-13
C405.3

Proposed Change as Submitted

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Delete without substitution as follows:

~~**C405.3 Tandem wiring (Mandatory).** The following luminaires located within the same area shall be tandem wired:~~

1. ~~Fluorescent luminaires equipped with one, three or odd-numbered lamp configurations, that are recess- mounted within 10 feet (3048 mm) center-to-center of each other.~~
2. ~~Fluorescent luminaires equipped with one, three or any odd-numbered lamp configuration that are pendant- or surface-mounted within 1 foot (305 mm) edge-to-edge of each other.~~

~~**Exceptions:**~~

1. ~~Where electronic high-frequency ballasts are used.~~
2. ~~Luminaires on emergency circuits.~~
3. ~~Luminaires with no available pair in the same area.~~

Reason: Simplify the code by removing an obsolete provision. This provision refers to obsolete magnetic ballast technology and no longer serves any purpose. Electronic ballasts are now used for all fluorescent luminaires, and since luminaires with electronic ballasts are exempt, then this provision would never apply and is pointless. It was removed from the 2010 version of Standard 90.1 for these reasons.

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

C405.3-EC-HEINMILLER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The provisions address obsolete technology.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.1 General (Mandatory). This section covers lighting system controls, ~~the connection of ballasts~~, the maximum lighting power for interior and exterior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

Commenter's Reason: This proposal CE308 removes the only requirement in the code covering the "connection of ballasts". The general description in C405.1 needs to be modified to reflect this

CE308-13

Final Action: AS AM AMPC____ D

CE309-13
C405.5.1

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power ~~(watts)~~ shall be ~~the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4~~ determined in accordance with Equation 4-6.

TCLP = [SL + LV + LTPB + Other] (**Equation 4-6)**

where:

TCLP = total connected lighting power (watts)
SL = labeled wattage of luminaires for screw in lamps
LV = wattage of the transformer supplying low-voltage lighting
LTPB = wattage of line-voltage lighting tracks and plug-in busways as the specified wattage of the luminaires but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current limiting devices on the system
Other = the wattage of all other luminaires and lighting sources not covered above and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   - 1.1. Professional sports arena playing field lighting.
   - 1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings.
   - 1.3. Emergency lighting automatically off during normal building operation.
   - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   - 1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   - 1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   - 2.1. Task lighting for medical and dental purposes.
   - 2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.

10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: The provisions in Section C405.5.1 deal with the determination of a value for the actual connected interior lighting power in a building that is more appropriately addressed as an equation. This proposal simplifies the provisions associated with connected interior lighting power to present as an equation what is now text that guides how the connected lighting power is calculated. The objective of this proposal is to simplify the code to foster implementation and compliance verification.

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

C405.5.1 #1-EC-WILLIAMS.doc

Committee Action Hearing Results

The following errata were not posted to the ICC website. The proposal also includes deleting the following sections.

~~**C405.5.1.1 Screw lamp holders.** The wattage shall be the maximum *labeled* wattage of the luminaire.~~

~~**C405.5.1.2 Low-voltage lighting.** The wattage shall be the specified wattage of the transformer supplying the system.~~

~~**C405.5.1.3 Other luminaires.** The wattage of all other lighting equipment shall be the wattage of the lighting equipment verified through data furnished by the manufacturer or other *approved* sources.~~

~~**C405.5.1.4 Line-voltage lighting track and plug-in busway.** The wattage shall be:~~

1. ~~The specified wattage of the luminaires included in the system with a minimum of 30 W/lin ft. (98 W/lin. m);~~
2. ~~The wattage limit of the system's circuit breaker; or~~
3. ~~The wattage limit of other permanent current limiting device(s) on the system.~~

(Portions of proposal not shown remain unchanged)

Committee Action: Approved as Submitted

Committee Reason: The proposal takes existing text in 4 subsections and replaces them with an equation that does the same thing. The committee felt the proposal simplified the code without any resulting technical change.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Equation 4-6.

~~TCLP~~ TCILP = [SL + LV + LTPB + Other] (**Equation 4-6)**

where:

~~TCLP~~ TCILP = total connected interior lighting power (watts)
SL = labeled wattage of luminaires for screw in lamps

LV = wattage of the transformer supplying low-voltage lighting

LTPB = wattage of line-voltage lighting tracks and plug-in busways as the specified wattage of the luminaires but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current limiting devices on the system

Other = the wattage of all other luminaires and lighting sources not covered above and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings.
   1.3. Emergency lighting automatically off during normal building operation.
   1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   2.1. Task lighting for medical and dental purposes.
   2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff

Commenter's Reason: At the code development hearing, there was a concern raised through opposing testimony about "double-counting." The proponent indicated that there was no double-counting in the proposal, and this was re-verified when looking at the change and considering if a public comment to address any double counting was needed.

DOE reviewed how the code change placed the current provisions in Sections C405.5.1.1 through C405.5.1.4 in equation form, and verified that there is no double-counting in the code change proposal. When doing that re-evaluation, DOE did note that the term TCLP would be more accurate if it referred to <u>interior</u> lighting power, so as not to confuse the user of the code with exterior lighting power. The only change suggested in this public comment is to reference 'total connected <u>interior</u> lighting power," or TC<u>I</u>LP.

One comment DOE received on their draft public comment suggesting the following additional revisions to the code text that was recommended for approval at the first hearing.

SL = labeled wattage of luminaires <u>for 120-277 Volt</u> screw in lamps

LV = <u>Labeled wattage of low voltage lamps plus the estimated</u> wattage <u>loss</u> of the transformer<u>s</u> supplying low-voltage lighting

As stated in the original code change, the intent was to take what is currently a series of criteria in C405.5.1.1 through C405.5.1.4 that guide how wattage is to be determined, and put the provisions in those subsections in a more understandable and usable equation format. DOE did not propose any technical changes to the provisions in those subsections in the original change that was recommended for approval.

DOE feels a further modification to this public comment, as suggested above, would change the requirement in the current code and the equation form of that requirement as approved at the first hearing. For that reason, DOE did not choose to implement the above recommendation by further revising this public comment. The purpose for using the transformer rating in the current requirements is similar to the purpose for using the circuit capacity or permanent circuit limiter capacity associated with line voltage track. Since these systems can have additional lamps easily installed after compliance is verified, the code must capture what that maximum could be for compliance. It currently does that in C405.5.1.2 and the LV component of the equation above. Similarly C405.5.1.1 does not specify a voltage range for screw in lamps so DOE did not include it in the original code change that was approved and does not feel it appropriate to include it in this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. <u>EERE-2012-BT-BC-0030</u>) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE309-13

Final Action: AS AM AMPC____ D

CE310-13
C405.5.1, C405.5.3 (NEW), Table C405.5.2(1), Table C405.5.2(2)

Proposed Change as Submitted

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings<u>, provided that the lighting complies with Section R404.1.</u>
   1.3. Emergency lighting automatically off during normal building operation.
   1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   1.6. Casino gaming areas.
   <u>1.7. Mirror lighting in dressing rooms.</u>

(Portions of text not shown remains unchanged)

<u>**C405.5.3 Additional interior lighting power.** Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:</u>

1. <u>For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall not exceed 1.0 W/ft^2 of such spaces.</u>

TABLE C405.5.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft2)
Automotive facility	~~0.9~~ <u>0.80</u>
Convention center	~~1.2~~ <u>1.01</u>
Courthouse	~~1.2~~ <u>1.01</u>

BUILDING AREA TYPE	LPD (w/ft2)
Dining: bar lounge/leisure	~~1.3~~ 1.01
Dining: cafeteria/fast food	~~1.4~~ 0.9
Dining: family	~~1.6~~ 0.95
Dormitory	~~1.0~~ 0.57
Exercise center	~~1.0~~ 0.84
Fire station	~~0.8~~ 0.67
Gymnasium	~~1.1~~ 0.94
Health care clinic	~~1.0~~ 0.90
Hospital	~~1.2~~ 1.05
Hotel/Motel	~~1.0~~ 0.87
Library	~~1.3~~ 1.19
Manufacturing facility	~~1.3~~ 1.17
~~Motel~~	~~1.0~~
Motion picture theater	~~1.2~~ 0.76
Multifamily	~~0.7~~ 0.51
Museum	~~1.1~~ 1.02
Office	~~0.9~~ 0.82
Parking garage	~~0.3~~ 0.21
Penitentiary	~~1.0~~ 0.81
Performing arts theater	~~1.6~~ 1.39
Police station	~~1.0~~ 0.87
Post office	~~1.1~~ 0.87
Religious building	~~1.3~~ 1.0
Retail	~~1.4~~ 1.26
School/University	~~1.2~~ 0.87
Sports arena	~~1.1~~ 0.91
Town hall	~~1.1~~ 0.89

BUILDING AREA TYPE	LPD (w/ft2)
Transportation	~~1.0~~ 0.70
Warehouse	~~0.6~~ 0.66
Workshop	~~1.4~~ 1.19

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft2)
Atrium -~~First~~ that is < 40 feet in height	0.03 per ft. in total height ~~ht.~~
Atrium - ~~Above~~ that is > 40 feet in height	0.40 + 0.02 per ft. in total height ~~ht.~~
Audience/seating area - permanent	
For auditorium	~~0.9~~ 0.63
For performing arts theater	~~2.6~~ 2.43
For motion picture theater	~~1.2~~ 1.14
Classroom/lecture/training	~~1.30~~ 1.24
Conference/meeting/multipurpose	~~1.2~~ 1.23
Copy/Print room	0.72
Corridor/transition	~~0.7~~ 0.66
Computer Room	1.71
Dining area	
Bar/lounge/leisure dining	~~1.40~~ 1.07
Family dining area	~~1.40~~ 0.89
Cafeteria/Fast Food Dining	0.65
Dressing/fitting room in performing arts theater	~~1.1~~ 0.61
Electrical/mechanical	~~1.10~~ 0.42
Emergency Vehicle Garage	0.56
Food preparation	~~1.20~~ 1.21
Laboratory for classrooms	~~1.3~~ 1.43
Laboratory for medical/industrial/research	~~1.8~~ 1.81
Laundry/Washing area	0.60
Loading Dock (interior)	~~0.47~~
Lobby	~~1.10~~ 0.90
Lobby for performing arts theater	~~3.3~~ 2.00
Lobby for motion picture theater	~~1.0~~ 0.59
Lobby - elevator	0.64
Lobby for Hotel	1.06
Locker room	~~0.80~~ 0.75

Lounge~~/ recreation~~ Breakroom	~~0.8~~ 0.73
Office- enclosed	~~1.1~~ 1.11
Office- open plan	~~1.0~~ 0.98
Pharmacy Area	1.68
Restroom	~~1.0~~ 0.98
Sales area	~~1.6[a]~~ 1.44
Stairway	~~0.70~~ 0.69
Storage	~~0.8~~ 0.63
Vehicular Maintenance Area	0.67
Workshop	~~1.60~~ 1.59
BUILDING SPECIFIC SPACE-BY-SPACE TYPES	
Courthouse/police station/penitentiary Courtroom Confinement cells ~~Judge chambers~~ Penitentiary audience seating Penitentiary classroom Penitentiary dining	 ~~1.90~~ 1.72 ~~1.1~~ 0.81 ~~1.3~~ ~~0.5~~ 0.28 ~~1.3~~ 1.34 ~~1.1~~ 0.96
~~Automotive- service/repair~~	~~0.70~~
Bank/office- banking activity area	~~1.5~~ 1.01
Dormitory ~~living quarters~~ bedrooms	~~1.10~~ 0.38
Gymnasium/fitness center ~~Fitness~~ Exercise area Gymnasium audience/seating Playing area	 ~~0.9~~ 0.72 ~~0.40~~ 0.65 ~~1.40~~ 1.2
Healthcare clinic/hospital Corridors/transition Exam/treatment ~~Emergency~~ ~~Public and staff lounge~~ Medical supplies Nursery Nurse station Physical therapy Patient room ~~Pharmacy~~ Radiology/imaging Operating room Recovery Lounge/Breakroom ~~Laundry - washing~~	 ~~1.00~~ 0.99 ~~1.7~~ 1.66 ~~2.70~~ ~~0.80~~ ~~1.40~~ 0.74 ~~0.9~~ 0.88 ~~1.00~~ 0.71 ~~0.90~~ 0.91 ~~0.70~~ 0.62 ~~1.20~~ ~~1.3~~ 1.51 ~~2.20~~ 2.48 ~~1.2~~ 1.15 ~~0.8~~ 0.92 ~~0.60~~
~~Hotel~~ ~~Dining area~~ ~~Guest rooms~~ ~~Hotel lobby~~ ~~Highway lodging dining~~ ~~Highway lodging guest rooms~~	 ~~1.30~~ ~~1.10~~ ~~2.10~~ ~~1.20~~ ~~1.10~~

Library Stacks ~~Card file and cataloguing~~ Reading area	~~1.70~~ 1.71 ~~1.10~~ ~~1.20~~ 1.06
Manufacturing Corridors/transition Detailed manufacturing Equipment room Extra high bay (>50-foot floor-ceiling height) High bay (25-- 50-foot floor-ceiling height) Low bay(< 25-foot floor-ceiling height)	~~0.40~~ 0.41 ~~1.3~~ 1.29 ~~1.0~~ 0.74 ~~1.1~~ 1.05 ~~1.20~~ 1.23 ~~1.2~~ 1.19
Museum General exhibition Restoration	~~1.00~~ 1.05 ~~1.70~~ 1.02
Parking garage - garage areas	~~0.2~~ 0.19
Convention center Exhibit space Audience/seating area	~~1.50~~ 1.45 ~~0.90~~ 0.82
~~Fire stations~~ ~~Engine room~~ Fire Station Sleeping Quarters	 ~~0.80~~ ~~0.30~~ 0.22
Post office Sorting area	~~0.9~~ 0.94
Religious building Fellowship hall Audience seating Worship pulpit/choir	~~0.60~~ 0.64 ~~2.40~~ 1.53 ~~2.40~~ 1.53
Retail Dressing/fitting area Mall concourse Sales area	~~0.9~~ 0.71 ~~1.6~~ 1.10 ~~1.6~~ 1.59
Sports arena Audience seating ~~Court sports~~ Playing area - Class 4 ~~Court sports~~ Playing area - Class 3 ~~Court sports~~ Playing area - Class 2 ~~Court sports~~ Playing area - Class 1 ~~Ring sports area~~	~~0.4~~ 0.43 ~~0.7~~ 1.20 ~~1.2~~ 1.80 ~~1.9~~ 2.40 ~~3.0~~ 3.68 ~~2.7~~
Transportation Air/train/bus baggage area Airport concourse Terminal - ticket counter	~~1.00~~ 0.53 ~~0.60~~ 0.36 ~~1.50~~ 0.80
Warehouse ~~Fine material storage~~ small hand-carried items Medium/bulky material, palletized items	 ~~1.40~~ 0.95 ~~0.60~~ 0.58

(Portions of Table not shown remain unchanged)

Reason: The purpose of this change is to adjust the lighting power density allowances to the best available values. “Best” means values and methodology for determining allowances that will lead to high energy-efficiency while still allowing high-quality lighting and sufficient light levels. We believe that the best source for these values are the models maintained by Pacific Northwest National Lab (PNNL) for the DOE in support of ASHRAE/IES Standard 90.1 development. Recently the models were updated to account for some changes in recommended light levels in the new Lighting Handbook, 10th Edition from the Illuminating Engineering Society

(IES). Additionally several new space types were added and some space types renamed or removed for clarity. Also, the Building Area Method values were based on a larger data set with 56% additional representative buildings.

Additional explanation of proposed changes by section:

Exception 1.2 to C405.5.1, (Sleeping Unit exception to lighting power limits)

Sleeping Units should be subject to the same requirements as Dwelling Units and residential buildings covered by Chapter 4 [RE].

Add exception for Mirror Lighting in Dressing Rooms.

Because this exception is in Standard 90.1, we assume that the LPD for Dressing/Fitting Room space types was developed with mirror lighting excluded. Without this exception the LPD limit for Dressing Rooms would be too low.

Add "Additional Interior Lighting Power" section.

This provision is an integral part of the space-by-space method. IECC-2012 already includes the additional power for retail as a footnote to the LPD table. The proposal adds the special allowance for decorative lighting and lighting for art and exhibits. IECC-2012 is missing this allowance, which is why some of the LPD values in IECC-2012 for some space types are higher than 90.1-2010. This allowance is a "use it or lose it" addition that can only be used for certain types of lighting. This provision gives the designer more flexibility but should not result in significant increase or decrease in stringency. The proposed new space-by-space LPD values were developed with the understanding that this additional allowance is available to the designer. The LPDs would not be valid for many space types without this additional allowance.

Revise Building Area Method LPDs (Table C405.5.2(1))

As mentioned above, these proposed values are from current PNNL models. These values were published in the public review draft of Addendum "co" to ASHRAE/IES Standard 90.1.

Revise Space-by-space Method LPDs (Table C405.5.2(2))

As mentioned above, these proposed values and space types are from current PNNL models. These values were published in the public review draft of Addendum "bh" to ASHRAE/IES Standard 90.1. The formatting and the ordering of space types that is in the IECC-2012 table were changed as little as possible. In order to accommodate the new space types, and the renaming or removal of a few space types, some rearrangement was necessary.

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

C405.5.1 #1-EC-HEINMILLER.doc

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The changes proposed increase the usability of the IECC. Designers are already using these revised provisions in their designs.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

~~COMMON SPACE-BY-SPACE TYPES~~	~~LPD (w/ft2)~~
~~Atrium -that is < 40 feet in height~~	~~0.03 per ft. in total height ht.~~
~~Atrium - that is > 40 feet in height~~	~~0.40 + 0.02 per ft. in total height ht.~~
~~Audience/seating area - permanent~~ ~~For auditorium~~ ~~For performing arts theater~~ ~~For motion picture theater~~	 ~~0.63~~ ~~2.43~~ ~~1.14~~
~~Classroom/lecture/training~~	~~1.24~~

~~Conference/meeting/multipurpose~~	~~1.23~~
~~Copy/Print room~~	~~0.72~~
~~Corridor/transition~~	~~0.66~~
~~Computer Room~~	~~1.71~~
~~Dining area~~ ~~Bar/lounge/leisure dining~~ ~~Family dining area~~ ~~Cafeteria/Fast Food Dining~~	 ~~1.07~~ ~~0.89~~ ~~0.65~~
~~Dressing/fitting room in performing arts theater~~	~~0.61~~
~~Electrical/mechanical~~	~~0.42~~
~~Emergency Vehicle Garage~~	~~0.56~~
~~Food preparation~~	~~1.21~~
~~Laboratory for classrooms~~	~~1.43~~
~~Laboratory for medical/industrial/research~~	~~1.81~~
~~Laundry/Washing area~~	~~0.60~~
~~Loading Dock (interior)~~	~~0.47~~
~~Lobby~~	~~0.90~~
~~Lobby for performing arts theater~~	~~2.00~~
~~Lobby for motion picture theater~~	~~0.59~~
~~Lobby - elevator~~	~~0.64~~
~~Lobby for Hotel~~	~~1.06~~
~~Locker room~~	~~0.75~~
~~Lounge/Breakroom~~	~~0.73~~
~~Office- enclosed~~	~~1.11~~
~~Office- open plan~~	~~0.98~~
~~Pharmacy Area~~	~~1.68~~
~~Restroom~~	~~0.98~~
~~Sales area~~	~~1.44~~
~~Stairway~~	~~0.69~~
~~Storage~~	~~0.63~~
~~Vehicular Maintenance Area~~	~~0.67~~
~~Workshop~~	~~1.59~~
~~BUILDING SPECIFIC SPACE-BY-SPACE TYPES~~	
~~Courthouse/police station/penitentiary~~ ~~Courtroom~~ ~~Confinement cells~~ ~~Penitentiary audience seating~~ ~~Penitentiary classroom~~ ~~Penitentiary dining~~	 ~~1.72~~ ~~0.81~~ ~~0.28~~ ~~1.34~~ ~~0.96~~
~~Bank/office- banking activity area~~	~~1.01~~
~~Dormitory bedrooms~~	~~0.38~~
~~Gymnasium/fitness center~~ ~~Exercise area~~ ~~Gymnasium audience/seating~~ ~~Playing area~~	 ~~0.72~~ ~~0.65~~ ~~1.2~~

~~Healthcare clinic/hospital~~	
~~Corridors/transition~~	~~0.99~~
~~Exam/treatment~~	~~1.66~~
~~Medical supplies~~	~~0.74~~
~~Nursery~~	~~0.88~~
~~Nurse station~~	~~0.71~~
~~Physical therapy~~	~~0.91~~
~~Patient room~~	~~0.62~~
~~Radiology/imaging~~	~~1.51~~
~~Operating room~~	~~2.48~~
~~Recovery~~	~~1.15~~
~~Lounge/Breakroom~~	~~0.92~~
~~Library~~	
~~Stacks~~	~~1.71~~
~~Reading area~~	~~1.06~~
~~Manufacturing~~	
~~Corridors/transition~~	~~0.41~~
~~Detailed manufacturing~~	~~1.29~~
~~Equipment room~~	~~0.74~~
~~Extra high bay (>50-foot floor-ceiling height)~~	~~1.05~~
~~High bay (25-- 50-foot floor-ceiling height)~~	~~1.23~~
~~Low bay(< 25-foot floor-ceiling height)~~	~~1.19~~
~~Museum~~	
~~General exhibition~~	~~1.05~~
~~Restoration~~	~~1.02~~
~~Parking garage - garage areas~~	~~0.19~~
~~Convention center~~	
~~Exhibit space~~	~~1.45~~
~~Audience/seating area~~	~~0.82~~
~~Fire Station Sleeping Quarters~~	~~0.22~~
~~Post office Sorting area~~	~~0.94~~
~~Religious building~~	
~~Fellowship hall~~	~~0.64~~
~~Audience seating~~	~~1.53~~
~~Worship pulpit/choir~~	~~1.53~~
~~Retail~~	
~~Dressing/fitting area~~	~~0.71~~
~~Mall concourse~~	~~1.10~~
~~Sales area~~	~~1.59~~
~~Sports arena~~	
~~Audience seating~~	~~0.43~~
~~Playing area - Class 4~~	~~1.20~~
~~Playing area - Class 3~~	~~1.80~~
~~Playing area - Class 2~~	~~2.40~~
~~Playing area - Class 1~~	~~3.68~~
~~Transportation~~	
~~Air/train/bus baggage area~~	~~0.53~~
~~Airport concourse~~	~~0.36~~
~~Terminal - ticket counter~~	~~0.80~~
~~Warehouse~~	
~~small hand-carried items~~	~~0.95~~
~~Medium/bulky material, palletized items~~	~~0.58~~

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

Common Space Types[a]	**LPD (watts/sq.ft)**
Atrium	
… that is < 20' in height	0.03 per foot in total height

… that is ≥ 20' and ≤ 40' in height	0.03 per foot in total height
… that is > 40' in height	0.40 + 0.02 per foot in total height
Audience Seating Area	
... in an auditorium	0.63
... in a convention center	0.82
… in a gymnasium	0.65
... in a motion picture theater	1.14
... in a penitentiary	0.28
... in a performing arts theater	2.43
... in a religious building	1.53
... in a sports arena	0.43
… otherwise	0.43
Banking Activity Area	1.01
Breakroom (See Lounge/Breakroom)	
Classroom/Lecture Hall/Training Room	
… in a penitentiary	1.34
… otherwise	1.24
Conference/Meeting/Multipurpose Room	1.23
Confinement Cells	0.81
Copy/Print Room	0.72
Corridor[b]	
… in a Facility for the Visually Impaired (and not used primarily by the staff)[c]	0.92
… in a hospital	0.79
… in a manufacturing facility	0.41
… otherwise	0.66
Courtroom	1.72
Computer Room	1.71
Dining Area	
… in a penitentiary	0.96
… in a Facility for the Visually Impaired (and not used primarily by the staff)[c]	1.9
… in Bar/Lounge or Leisure Dining	1.07
… in Cafeteria or Fast Food Dining	0.65
… in Family Dining	0.89
… otherwise	0.65
Electrical/Mechanical Room	0.42
Emergency Vehicle Garage	0.56
Food Preparation Area	1.21
Guest Room	0.47
Laboratory	
… in or as a classroom	1.43
… otherwise	1.81
Laundry/Washing Area	0.6
Loading Dock, Interior	0.47
Lobby	
… in a Facility for the Visually Impaired (and not used primarily by the staff)[c]	1.8
… for an elevator	0.64
… in a hotel	1.06

… in a motion picture theater	0.59
… in a performing arts theater	2
… otherwise	0.9
Locker Room	0.75
Lounge/Breakroom	
… in a healthcare facility	0.92
… otherwise	0.73
Office	
… enclosed and <= 250 sq.ft	1.11
… enclosed and > 250 sq.ft	1.11
… open plan	0.98
Parking Area, Interior	0.19
Pharmacy Area	1.68
Restroom	
… in a Facility for the Visually Impaired (and not used primarily by the staffs[c]	1.21
… otherwise	0.98
Sales Area	1.59
Seating Area, General	0.54
Stairway	See space containing stairway
Stairwell	0.69
Storage Room	
… < 50 sq.ft	0.63
… >= 50 sq.ft and <= 1,000 sq.ft	0.63
… otherwise	0.63
Vehicular Maintenance Area	0.67
Workshop	1.59
Building Type Specific Space Types[a]	**LPD (watts/sq.ft)**
Facility for the Visually Impaired[c]	
… in a chapel (and not used primarily by the staff)	2.21
… in a recreation room (and not used primarily by the staff)	2.41
Automotive (See Vehicular Maintenance Area above)	
Convention Center - Exhibit Space	1.45
Dormitory - Living Quarters	0.38
Fire Station - Sleeping Quarters	0.22
Gymnasium/Fitness Center	
… in an Exercise Area	0.72
… in a Playing Area	1.2
Healthcare Facility	
… in an Exam/Treatment Room	1.66
… in an Imaging Room	1.51
….in a Medical Supply Room	0.74
… in a Nursery	0.88
… in a Nurse's Station	0.71
… in an Operating Room	2.48
… in a Patient Room	0.62
… in a Physical Therapy Room	0.91
… in a Recovery Room	1.15
Library	
… in a Reading Area	1.06
… in the Stacks	1.71

Manufacturing Facility	
… in a detailed manufacturing area	1.29
… in an Equipment Room	0.74
… in an Extra High Bay Area (> 50' floor-to-ceiling height)	1.05
… in a High Bay Area (25-50' floor-to-ceiling height)	1.23
… in a Low Bay Area (< 25' floor-to-ceiling height)	1.19
Museum	
… in a General Exhibition Area	1.05
… in a Restoration Room	1.02
Performing Arts Theater - Dressing Room	0.61
Post Office - Sorting Area	0.94
Religious Buildings	
… in a Fellowship Hall	0.64
… in a Worship/Pulpit/Choir Area	1.53
Retail Facilities	
… in a Dressing/Fitting Room	0.71
… in a Mall Concourse	1.1
Sports Arena - Playing Area	
… for a Class I facility	3.68
… for a Class II facility	2.4
… for a Class III facility	1.8
… for a Class IV facility	1.2
Transportation Facility	
… in a baggage/carousel Area	0.53
… in an Airport Concourse	0.36
… at a Terminal Ticket Counter	0.8
Warehouse - Storage Area	
…for medium to bulky, palletized items	0.58
… for smaller, hand-carried items	0.95

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply

b. In corridors, the extra LPD allowance is not based on the RCR and shall be permitted when the width of the corridor is less than 8 feet

c. A ‘Facility for the Visually Impaired’ is a facility that is licensed or will be licensed by local or state authorities for either senior long-term care, adult daycare, senior support and/or people with special visual needs.

(Portions of the proposal not shown remain unchanged)

Commenter’s Reason: The intent of the original proposal is to have the space by space lighting power densities in the IECC match the lighting power densities in 90.1. Standard 90.1-2013 will also be published to include a reformatted space by space table which is intended to have consistent formatting, and hopefully more readable and usable. For example, the current Table in the IECC has separate rows for Atriums less than 40 feet in height, and Atriums greater than 40 feet in height, then in the next row for audience/seating areas, there are three rows in the group. This comment makes it so similar types of spaces are grouped together, then if there are separate requirements for different types of spaces in a similar grouping, the requirements are broken out in a consistently formatted manner.

This proposal will make the values in the table, and the formatting of the table consistent with how they will be published in 90.1-2013.

CE310-13

Final Action: AS AM AMPC____ D

CE312-13
C405.5.1

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   - 1.1. Professional sports arena playing field lighting.
   - 1.2. Lighting *units* ~~lighting in hotels, motels, boarding houses or similar buildings~~.
   - 1.3. Emergency lighting automatically off during normal building operation.
   - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   - 1.5. Lighting in interior spaces that have been specifically designated as a reg-istered interior historic landmark.
   - 1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   - 2.1. Task lighting for medical and dental purposes.
   - 2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: This proposal simplifies the exception to the interior lighting power in sleeping units. The definition of sleeping unit is such that there is no further need to delineate the building type in which the sleeping unit is located. In fact, the delineation suggests there are others that are not "similar" to hotels, motels, and boarding houses where the exception would not apply (e.g., dormitories).

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

C405.5.1 #2-EC-WILLIAMS.doc

Committee Action Hearing Results

The following errata were not posted to the ICC website. The added text 'Lighting in ' should have been underlined.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. Lighting in *sleeping units.*

Committee Action: Disapproved

Committee Reason: The committee is concerned that reducing the text to sleeping units, that the application to guest rooms that are full dwelling units is unclear.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: At the code development hearing, there was no opposition to proposal CE312-13 from the floor. After it went to committee, there was a concern raised that the proposal language would open the door to exempting suites from the lighting provisions in the code. As it had gone to committee, there was no further opportunity to provide a response. The apparent confusion about sleeping units was enough to create doubt, and the code change proposal was disapproved with a vote of 5 to 4.

Proposal CE312-13 is simply a clarification to the code. The term "lighting in" is needed to provide a subject for the exception, and is consistent with other exceptions to Section C405.5.1 and general criteria in Section C405. The code currently uses a vague and undefined term "other similar buildings" that leads to interpretation issues when considering buildings other than hotels, motels, or boarding houses. Most important, regardless of the above two clarifications in the code, the end result is the current code exempts lighting in sleeping units from consideration in the LPD calculation, and the proposed code text does, as well.

The current code clearly intends that lighting in sleeping units not be included in the LPD calculations. *Sleeping unit* is defined in Chapter 2 of the code as:

> A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

As defined, there appears no need to indicate what types of buildings such a unit must be located in. For instance, if a suite meets the definition of a sleeping unit, then under the current code and proposed code it would be exempt. If it is not a sleeping unit, then, by definition, it is a dwelling unit and is **not** exempt – the distinction being a dwelling unit, unlike a sleeping unit, has **both** sanitation and kitchen facilities.

The reason given for disapproval was the unclear nature of the application of lighting requirements to guest rooms that are full dwelling units. Both terms are defined in the code, and the intent of proposal CE312-13 is not to change the definitions or requirements, but simply to clarify the exception. If a room, suite, area or other living space in any building is defined as a sleeping unit, then the code exempts the lighting in that space from the LPD criterion. If not a sleeping unit, then it is a dwelling unit and therefore not exempt. CE312-13 makes no change to those requirements. If there is a concern about the unclear application of the lighting criteria, it will remain in the existing code if this change is disapproved, because the terms used are defined in the current code without respect to the type of building in which the sleeping units or dwelling units are located.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE312-13
Final Action: AS AM AMPC____ D

CE319-13
C405.6, C405.6.1, C405.6.2

Proposed Change as Submitted

Proponent: Glenn Heinmiller, Lam Partners, International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.6 Exterior lighting (Mandatory). Where the power for exterior lighting is supplied through the energy service to the building, all exterior lighting, ~~other than low-voltage landscape lighting~~, shall comply with Section~~s~~ ~~C405.6.1 and~~ C405.6.2.

> **Exception:** Where *approved* because of historical, safety, signage or emergency considerations.

~~**C405.6.1 Exterior building grounds lighting.** All exterior building grounds luminaires that operate at greater than 100 watts shall contain lamps having a minimum efficacy of 60 lumens per watt unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.6.2.~~

C405.6.2 Exterior building lighting power. The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated and are permitted in Table C405.6.2(2) for the applicable lighting zone. Tradeoffs are allowed only among exterior lighting applications listed in Table C405.6.2(2), Tradable Surfaces section. The lighting zone for the building exterior is deter- mined from Table C405.6.2(1) unless otherwise specified by the local jurisdiction. ~~Exterior lighting for all applications (except those included in the exceptions to Section C405.6.2) shall comply with the requirements of Section C405.6.1.~~

> **Exception:** Lighting used for the following exterior applications is exempt where equipped with a control device independent of the control of the nonexempt lighting:
>
> 1. Specialized signal, directional and marker lighting associated with transportation;
> 2. Advertising signage or directional signage;
> 3. Integral to equipment or instrumentation and is installed by its manufacturer;
> 4. Theatrical purposes, including performance, stage, film production and video production;
> 5. Athletic playing areas;
> 6. Temporary lighting;
> 7. Industrial production, material handling, transportation sites and associated storage areas;
> 8. Theme elements in theme/amusement parks; and
> 9. Used to highlight features of public monuments and registered historic landmark structures or buildings.

Reason: Simplify the code without reducing stringency.
C405.6 -The exemption of “low-voltage landscape lighting” makes no sense and adds unnecessary complexity. This exemption is not in Standard 90.1.
C405.6.1 This is an obsolete and redundant provision that should have been removed from IECC when the lighting power density method was introduced for exterior lighting. The provision adds no value to the code and increases complexity.

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

C405.6-EC-HEINMILLER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Refines the requirement to focus on the system of lighting and not individual fixtures.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior <u>and exterior</u> applications, electrical energy consumption, ~~and minimum acceptable lighting equipment for exterior applications~~.

Commenter's Reason: This proposal CE319 removes the only requirement in the code covering the "minimum acceptable lighting equipment for exterior applications". Exterior lighting is regulated by limiting lighting power. The general description in C405.1 needs to be modified to reflect this.

CE319-13

Final Action: AS AM AMPC____ D

CE323-13
C405.7, C405.7.1 (NEW), C405.7.2 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.7 Electrical energy consumption (Mandatory). ~~In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units~~. Meters, metering devices or other provisions shall be installed capable of determining the electrical energy consumed by and within the building in accordance with this section.

C405.7.1 Multi-family residential buildings. In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed within each dwelling unit by separately metering individual dwelling units.

C405.7.2 Buildings other than multi-family residential buildings. Metering devices capable of measuring electrical energy use shall be provided for the total electrical energy system, HVAC systems, interior lighting systems, exterior lighting systems and receptacle circuits in each building and, for other than shared systems, each separate tenancy within the building. The measurement devices shall have the capability to record electrical energy use at least every 15 minutes and report that use on at least an hourly, daily, monthly and annual basis and retain the recorded data at least 36 months.

Exceptions: Metering devices are not required for the following spaces and systems:

1. Buildings less than 10,000 square feet in net floor area.
2. Individual tenant spaces less than 5,000 square feet in net floor area.
3. Dwelling units
4. Residential buildings with less than 10,000 square feet of common area.
5. Critical and equipment branches covered in the Article 517 of NFPA 70

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to energy metering. The change ensures continued consistency between the IECC and standard 90.1-2010. It retains the current provisions in the IECC for multi-family residential buildings and then includes electrical metering provisions for other building types and occupancies.

Cost Impact: The code change proposal will increase the cost of construction when monitoring devices are required.

C405.7-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Consistent with the action taken on CE325-13, this similar proposal was disapproved.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.7 ~~Electrical~~ Energy ~~consumption~~ monitoring (Mandatory). Meters, metering devices or other provisions shall be installed in new buildings capable of determining the ~~electrical~~ energy consumed by and within the building in accordance with this section.

C405.7.1 System electrical energy monitoring. Metering devices capable of measuring electrical energy use shall be provided for each of the following: total electrical energy system, HVAC systems, interior lighting systems, exterior lighting systems and receptacle circuits in each building.

Metering devices capable of measuring electrical energy use shall be provided in each building for each of the following: total electrical energy system, HVAC systems, interior lighting systems, exterior lighting systems and receptacle circuits.

> **Exception:** Up to 10 percent of the electrical load being metered or monitored for HVAC systems, interior lighting systems, exterior lighting systems, and receptacle circuits shall be permitted to be from other electrical loads.

C405.7.1,1 Multi-family residential buildings. In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed within each dwelling unit by separately metering individual dwelling units.

C405.7.2 ~~Buildings other than multi-family residential buildings~~ Recording and reporting from monitoring. ~~Metering devices capable of measuring electrical energy use shall be provided for the total electrical energy system, HVAC systems, interior lighting systems, exterior lighting systems and receptacle circuits in each building.~~
The measurement devices shall have the capability to record electrical energy use at least every 15 minutes and report that use on at least an hourly, daily, monthly and annual basis and retain the recorded data for at least 36 months.

> **Exceptions:** Metering devices are not required for the following spaces and systems:
>
> 1. Buildings less than ~~10,000~~ 25,000 square feet in net floor area.
> 2. Individual tenant spaces less than ~~5,000~~ 10,000 square feet in net floor area.
> 3. Dwelling units and sleeping units
> 4. Group R-2 occupancy ~~Residential~~ buildings with less than 10,000 square feet of common area.
> 5. Critical and equipment branches covered in the Article 517 of NFPA 70
> 6. Group R-1 and A-2 occupancies.

C405.7.3 Whole building energy monitoring. Meters, metering devices or other provisions shall be installed at the building site to monitor the energy usage of each new building to monitor the building use of the following types of energy supplied by a utility, energy provider, or plant that is not within the building:

1. Natural gas
2. Fuel oil
3. Propane
4. Steam
5. Chilled water
6. Hot water

Exception: Whole building energy monitoring is not required for the following buildings, spaces, or equipment:

1. Buildings less than 25,000 square feet in net floor area.
2. Individual tenant spaces less than 10,000 square feet in net floor area.
3. Group R-2 occupancy buildings with less than 10,000 square feet of common area.
4. Equipment that uses fuel for on-site emergencies

C405.7.3.1 Recording and reporting or whole building energy use. When measurement devices are required in accordance with Section C405.7.3, the measurement devices shall have the capability to record energy use at least every 60 minutes and report that use on at least an hourly, daily, monthly and annual basis and retain the recorded data for at least 36 months.

Commenter's Reason: Submetering requirements were added to ASHRAE 90.1-2010. The proposed addendum expands the submetering requirements to cover all fuels that are used by a building. This will ensure that the building owners and operators receive information about all of the energy being used by building equipment.

This language will make the IECC consistent with the latest submetering requirements that will be published in ASHRAE 90.1-2013. This language is an improvement in that it requires that only new buildings meet the requirements, and also requires the metering of fossil fuels at buildings, which will lead to more energy savings. Several studies have shown that submetering, with the information provided to key personnel, leads to more energy savings during the operation of a building.

The requirements were changed to in addendum bn to 90.1-2013 which will be incorporated into 90.1-2013. There are cases where the submetering requirements would not be cost-justified, due to the number of submeters required, associated installation costs, and potentially low energy cost savings.

A new exception has been added so that for each of the systems being submetered, 10% of the loads can be different equipment (e.g., the meter for receptacles can also be monitoring some lighting). This is to account for electric panel and outlet connection reality (e.g., a desk lamp that is plugged into a receptacle is not really a "plug load", or if there are some receptacle loads being monitored by the "interior lighting" submeter).

These modifications focus the metering requirements on buildings and will ensure that the requirement is cost effective and will result in energy savings, especially in multi-building sites.

By requiring that all major forms of energy are metered, the proposed modifications will ensure that all opportunities for all types of energy and cost savings are addressed, rather than for just one form of energy.

By making these changes, we will prevent situations where hundreds of submeters are installed at a significant cost, especially for major renovations at existing buildings (e.g., hotels and motels with hundreds of fan coil units, PTACs, rooftop units, exhaust fans, etc), that are likely not to be cost-effective.

CE323-13

Final Action: AS AM AMPC____ D

CE326-13
C405.8 (New)

Proposed Change as Submitted

Proponent: Wayne Stoppelmoor, Schneider Electric (wayne.stoppelmoor@schneider-electric.com)

Add new text as follows:

C405.8 Energy monitoring (Mandatory). Buildings with a gross conditioned floor area over 25,000 square feet shall comply with Section C405.8.1 through C405.8.5. Buildings shall be equipped to measure, monitor, record and report energy consumption data for each end-use category required by Section C405.8.2.

> **Exception:** Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

C405.8.1 Electrical energy metering. For electrical energy, including all electrical energy supplied to the building and its associated site, including but limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.8.2.

C405.8.2 End-use metering categories. Meters or other measurement devices shall be provided to collect energy use data for each end-use category listed in Table 405.8.1. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories listed in Table 405.8.1 is permitted to be from a load not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. End-use metering is not required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering is not required for and individual tenant space having a floor area not greater than 2,500 square feet where a dedicated source meter complying with Section C405.8.3 is provided.

TABLE 405.8.1
ENERGY USE CATEGORIES

Load Category	**Description of energy use**
Total HVAC system	Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120 volt equipment, or by 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system energy use.
Interior lighting	Lighting systems located within the *building.*
Exterior lighting	Lighting systems located on the *building site* but not within the *building.*
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets
Process loads	Any single load that is not included in a HVAC, lighting, or plug load category and that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.

C405.8.3 Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.8.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.8.4 and C405.8.5.

C405.8.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C405.8.2.

C405.8.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C405.8.2 at least every hour, day, month and year for the previous 36 months.

Reason: This proposal saves energy by providing actionable and timely energy consumption data to building owners and operators. For large buildings, this data is further broken out by the major sub-systems (HVAC, lighting, process loads, and plug loads). Estimates in available literature of the energy savings to be expected from metering and monitoring systems vary from 2% to 15%. The effectiveness of each system depends on owners and facility managers observing and acting upon the data provided. Additionally, the 2013 version of ASHRAE Std. 90.1 and several state energy codes will be requiring energy monitoring.

Cost Impact: This requirement will cause a modest increase to the cost of construction. However, such increase in cost will be recovered in a short period of time due to the decreased energy consumed in the building.

. **C405.8 (NEW)-EC-STOPPELMOOR.doc**

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was similar to CE325-13 and was disapproved for the same reasons.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.8 Energy monitoring (Mandatory). New ~~B~~ buildings with a gross conditioned floor area over 25,000 square feet shall comply with Section C405.8.1 through C405.8.5. Buildings shall be equipped to measure, monitor, record and report energy consumption data for each energy supply category required by Section C405.8.1 and each end-use category required by Section C405.8.2.

> **Exception:** Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

C405.8.1 Energy supply metering. Buildings shall have a meter at each supply for electrical energy, natural gas, district steam, district chilled water and district hot water.

C405.8.1.1 Electrical energy metering. For electrical energy, including all electrical energy supplied to the building and its associated site, including but limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.8.2.

C405.8.2 End-use metering categories. Meters or other measurement devices shall be provided to collect electrical energy use data for each end-use category listed in Table 405.8.1. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories listed in Table 405.8.1 is permitted to be from a load not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. End-use metering is not required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering is not required for and individual tenant space having a floor area not greater than 2,500 square feet where a dedicated source meter complying with Section C405.8.3 is provided.

TABLE 405.8.1
ENERGY USE CATEGORIES

Load Category	Description of energy use
Total HVAC system	Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120 volt equipment, or by 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system energy use.
Interior lighting	Lighting systems located within the *building.*
Exterior lighting	Lighting systems located on the *building site* but not within the *building.*
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets
Process loads	Any single load that is not included in a HVAC, lighting, or plug load category and that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.

C405.8.3 Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.8.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.8.4 and C405.8.5.

C405.8.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each energy supply category required by Section C405.8.1 and each end-use category required by Section C405.8.2.

C405.8.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each energy supply category required by Section C405.8.1 and each end-use category required by Section C405.8.2 at least every hour, day, month and year for the previous 36 months.

Commenter's Reason: The overall energy supply entering a building provides the most important data for energy management. Such metering is a relatively inexpensive addition when using pulse meters attached to the main utility meters that serve the building and delivering data to the same monitoring system used for the sub-metering data. Cost for installing pulse meters varies by the utility, generally $500 to $1500 each for gas and electric.

In addition, the word "new" was added to the beginning of the proposal to clarify that it applies only to new construction.

Public Comment 2:

Andrei Moldoveanu, representing The National Electrical Manufacturers Association (NEMA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.8 Energy monitoring (Mandatory). ~~Buildings~~ New buildings with a gross conditioned floor area over ~~25,000~~ 50,000 square feet shall comply with Section C405.8.1 through C405.8.5. The gross conditioned floor area shall exclude the area of dwelling and sleeping units. Buildings shall be equipped to measure, monitor, record and report ~~energy~~ electric consumption data for each end-use category required by Section C405.8.2.

> **Exception:** Individual tenant spaces, including dwelling and sleeping units, are not required to comply with this section provided the space has its own ~~utility~~ electric meter ~~services and meters~~ and has less than ~~5,000~~ 20,000 square feet of conditioned floor area.

(*Balance of proposal remains unchanged)*

Commenter's Reason: The Committee rejected the proposal because 1) it was unclear if it applied to existing buildings; 2) the threshold of 25,000 square feet was too low; and 3) it was not clear if residential dwelling units were exempted. The modified proposal 1) makes it clear that this requirement only applies to new buildings; 2) increases the threshold to 50,000 square feet; and 3) exempts residential dwelling units. It is believed that this revised proposal overcomes the committee's objections. Additionally, there are numerous studies that show the installation of meters and sub-meters in buildings cause a reduction in energy usage.

The committee was not accurate when it said that this proposal (CE326) is similar to CE325. CE325 requires metering of many different fuel types; however, this proposal (CE326) only requires metering of electric energy, which has been demonstrated to reduce energy usage.

CE326-13

Final Action: AS AM AMPC____ D

CE328-13

C405.8 (NEW), C405.8.1 (NEW), C405.8.2 (NEW)

Proposed Change as Submitted

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C405.8 Requirements for solar-ready energy systems (Mandatory). In climates zones 1 through 6, infrastructure shall be provided within the building and space shall be allocated on the roof for future installation of on-site renewable energy systems. The infrastructure and allocated roof space shall be capable of accommodating an energy system with a minimum rating of 3.7 W/ft^2 or 13 Btu/h·ft^2 (40 W/m^2) multiplied by the total roof area in square feet (m^2) and shall comply with Section C405.8.2. Compliance with this section shall be documented as specified in Section C405.8.1.

Exceptions:

1. The portion of the total roof area shaded during the peak sun angle on the summer solstice by natural objects, permanent features of the building or by permanent features of adjacent buildings can be excluded from the total roof area for the purposes of this section.
2. Buildings incorporating an on-site renewable energy systems with a minimum rating of 3.7 W/ft^2 or 13 Btu/h·ft^2 (40 W/m^2) multiplied by the total roof area in square feet (m^2) do not have to meet the requirements of this section.
3. Buildings with four or more stories do not have to meet the requirements of this section .
4. Additions, alterations and repairs to existing buildings do not have to meet the requirements of this section.

C405.8.1 Documentation. Construction documents shall show allocated space and pathways for installation of on-site solar energy systems and associated infrastructure. Documents shall indicate a pathway for one of the following:

1. A pathway for routing of conduit from the roof or alternate reserved space to the main electrical service panel.
2. A pathway for routing of plumbing from the roof or alternate reserved space to the water-heating system.

C405.8.2 Building service for renewable systems. For solar electric the main electrical service panel shall have a minimum busbar rating sufficient to accommodate the power supply from the system and shall have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location and shall be permanently labeled with “For Solar Electric”.

Reason: This proposal provides for the option of installing a future on-site renewable energy system. Design alternatives for renewable systems are generally most plentiful and at the lowest cost at the time of new construction. As the cost of solar energy systems continues to fall, a building’s value can be enhanced by providing for the future installation of on-site renewable systems if they are not installed at the time of new construction.

The technical requirements in the proposal are based on values from Title 24 and ASHRAE 189.1 - 2008. The 3-story limitation in this proposal matches the broadest height exclusion in Title 24. The climate zone limits generally follow the annual insolation level of 4 kwh per square meter (source: NREL Flat Plate PV Solar Radiation map). The minimum equipment size ratings are based on ASHRAE 189.1.

The 2011 CASE study for the Title 24 solar-ready measure states: “The proposed code change does not require equipment installation nor does it have any incremental maintenance costs. The only costs associated with the measure are design costs. Initially designers will need to familiarize themselves with the solar-ready requirement, but over time design will become streamlined and the costs will be minimal.

Cost savings from retrofits will result when photovoltaic or solar water heating equipment is easily interconnected with the building electrical or plumbing systems. Installing PV or SWH systems on solar-ready buildings (as defined in the recommended code language) could reduce the installed cost of the system by as much as 10 percent."

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

C405.8 (NEW)-EC-EDELSON-MAKELA.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal only addresses solar and not other renewable energy installations such as wind. While intended to reduce barriers, it actually requires installation of features that may never be used.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Edelson, New Buildings Institute; Eric Makela / Britt/Makela Group, Inc. representing Northwest Energy Codes Group, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

APPENDIX A

RENEWABLE READY ENERGY SYSTEMS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopted ordinance.

SECTION AC101
GENERAL

AC101.1 General ~~**C405.8 Requirements for solar ready energy systems (Mandatory).**~~ Building projects ~~in climate zones 1-6~~ shall provide for the future installation of *on-site renewable energy* systems with a minimum rating of 3.7 W/ft2 or 13 Btu/h·ft2 (40 W/m2) multiplied by the ~~total roof area~~ horizontally-projected gross roof area less the area covered by rooftop equipment, skylights, occupied roof decks and planted areas. ~~in ft2 (m2). Building projects shall comply with sections C405.8.1 through C405.8.2.~~

Exceptions:

~~1. The proportion of the total roof area shaded during the peak sun angle on the summer solstice by natural objects, permanent features of the building or by permanent features of adjacent buildings.~~

~~2~~ 1. Buildings incorporating an *on-site renewable energy* system. ~~s with a minimum rating of 3.7 W/ft2 or 13 Btu/h·ft2 (40 W/m2) multiplied by the total roof area in ft2 (m2).~~

~~3~~ 2. Buildings with four or more stories.

~~4~~ 3. Additions, alterations and repairs to existing buildings

SECTION AC102
DOCUMENTATION

~~**C405.8.1**~~ **AC102.1 Documentation**. Construction documents shall show allocated space and pathways for installation of ~~*on-site renewable energy*~~ ~~solar energy~~ systems and associated infrastructure~~. Documents shall indicate a pathway for one of the following:~~

~~1. A pathway for routing of conduit from the roof or alternate reserved space to the main electrical service panel.~~

~~2. A pathway for routing of plumbing from the roof or alternate reserved space to the water-heating system.~~

~~**C405.8.2 Building service for renewable systems.** For solar electric the main electrical service panel shall have a minimum busbar rating sufficient to accommodate the power supply from the system and shall have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location and shall be permanently labeled with "For Solar Electric".~~

~~If accommodating future solar thermal systems, building projects shall document a pathway for routing of plumbing from the roof or alternate reserved space to the water heating system.~~

Commenter's Reason: The committee asked that this provision be placed in an Appendix and that it be made technology-neutral. The Comment simplifies and abbreviates the language, applies the existing definition of *on-site renewable energy* and renumbers the proposal to accomplish this. By placing the renewable-ready language in an Appendix, each jurisdiction will have the option for a technology-neutral measure that can help their state or community meet future planning goals with a low or no-cost requirement in current construction.

CE328-13

Final Action: AS AM AMPC____ D

CE329-13
C405.8 (NEW), Table C405.8 (NEW)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.8 Electrical transformers (Mandatory). Electric transformers shall meet the minimum efficiency requirements of Table C405.8 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exceptions: The following transformers are exempt:

1. Transformers that meet the Energy Policy Act of 2005 exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the Energy Policy Act of 2005 exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431
3. Transformers that meet the Energy Policy Act of 2005 exclusions with multiple voltage taps where the highest tap is at least 20 percent more than the lowest tap.
4. Drive transformers
5. Rectifier transformers
6. Auto-transformers
7. Uniterruptible power system transformers
8. Impendance transformers
9. Regulating transformers
10. Sealed and nonventilating transformers
11 Machine tool transformer
12. Welding transformer
13. Grounding transformer
15. Testing transformer

TABLE C405.8
Minimum Nominal Efficiency Levels for 10 CFR 431 Low Voltage Dry-Type Distribution Transformers

Single Phase Transformers		Three Phase Transformers	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8
		1000	98.9

a. kiloVolt-Amp rating.

b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low voltage dry-type transformers.

Add new definitions as follows:

LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER: A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 Volts, and is rated for operation at a frequency of 60 Hertz

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to electric low-voltage dry-type transformer efficiency provisions, an issue that is not currently addressed in the IECC Commercial Provisions. The change ensures continued consistency between the IECC and standard 90.1-2010/2013 and addresses an important component associated with improving building energy efficiency.

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

C405.8 (NEW)-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is consistent with federal regulations of transformers and its placement in the code will restrict the reuse of older transformers. Some on the committee felt that this wasn't appropriate for inclusion in an energy code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE329-13
Final Action: AS AM AMPC____ D

CE331-13

C405.8 (NEW), Table C405.8(1) (NEW), Table C405.8(2) (NEW), C405.8(3) (NEW), Table C405.8(4) (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.8 Electrical motors (Mandatory). Electric motors shall meet the minimum efficiency requirements of Tables C405.8 (1) through C405.8 (4) when tested and rated in accordance with the DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the motor manufacturer.

Table C405.8 (1)
Minimum Nominal Full-Load Efficiency for 60 HZ NEMA *General Purpose Electric Motors (Subtype I)* Rated 600 Volts or Less (Random Wound)[a]

	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	**2**	**4**	**6**	**2**	**4**	**6**
Synchronous Speed (RPM)	**3600**	**1800**	**1200**	**3600**	**1800**	**1200**
Motor Horsepower						
1	77.0	85.5	82.5	77.0	85.5	82.5
1.5	84.0	86.5	86.5	84.0	86.5	87.5
2	85.5	86.5	87.5	85.5	86.5	88.5
3	85.5	89.5	88.5	86.5	89.5	89.5
5	86.5	89.5	89.5	88.5	89.5	89.5
7.5	88.5	91.0	90.2	89.5	91.7	91.0
10	89.5	91.7	91.7	90.2	91.7	91.0
15	90.2	93.0	91.7	91.0	92.4	91.7
20	91.0	93.0	92.4	91.0	93.0	91.7
25	91.7	93.6	93.0	91.7	93.6	93.0
30	91.7	94.1	93.6	91.7	93.6	93.0
40	92.4	94.1	94.1	92.4	94.1	94.1
50	93.0	94.5	94.1	93.0	94.5	94.1
60	93.6	95.0	94.5	93.6	95.0	94.5
75	93.6	95.0	94.5	93.6	95.4	94.5
100	93.6	95.4	95.0	94.1	95.4	95.0
125	94.1	95.4	95.0	95.0	95.4	95.0
150	94.1	95.8	95.4	95.0	95.8	95.8
200	95.0	95.8	95.4	95.4	96.2	95.8
250	95.0	95.8	95.4	95.8	96.2	95.8

300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.8	95.8	95.8	96.2	95.8
450	95.8	96.2	96.2	95.8	96.2	95.8
500	95.8	96.2	96.2	95.8	96.2	95.8

a Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

Table C405.8 (2)
Minimum Nominal Full-Load Efficiency of *General Purpose Electric Motors (Subtype II)* and all Design B motors greater than 200 horsepower[a]

	Open Drip-Proof Motors				Totally Enclosed Fan Cooled Motors			
Number of Poles ==>	2	4	6	8	2	4	6	8
Synchronous Speed (RPM)==>	3600	1800	1200	900	3600	1800	1200	900
Motor Horsepower								
1	NR	82.5	80.0	74.0	75.5	82.5	80.0	74.0
1.5	82.5	84.0	84.0	75.5	82.5	84.0	85.5	77.0
2	84.0	84.0	85.5	85.5	84.0	84.0	86.5	82.5
3	84.0	86.5	86.5	86.5	85.5	87.5	87.5	84.0
5	85.5	87.5	87.5	87.5	87.5	87.5	87.5	85.5
7.5	87.5	88.5	88.5	88.5	88.5	89.5	89.5	85.5
10	88.5	89.5	90.2	89.5	89.5	89.5	89.5	88.5
15	89.5	91.0	90.2	89.5	90.2	91.0	90.2	88.5
20	90.2	91.0	91.0	90.2	90.2	91.0	90.2	89.5
25	91.0	91.7	91.7	90.2	91.0	92.4	91.7	89.5
30	91.0	92.4	92.4	91.0	91.0	92.4	91.7	91.0
40	91.7	93.0	93.0	91.0	91.7	93.0	93.0	91.0
50	92.4	93.0	93.0	91.7	92.4	93.0	93.0	91.7
60	93.0	93.6	93.6	92.4	93.0	93.6	93.6	91.7
75	93.0	94.1	93.6	93.6	93.0	94.1	93.6	93.0
100	93.0	94.1	94.1	93.6	93.6	94.5	94.1	93.0
125	93.6	94.5	94.1	93.6	94.5	94.5	94.1	93.6
150	93.6	95.0	94.5	93.6	94.5	95.0	95.0	93.6
200	94.5	95.0	94.5	93.6	95.0	95.0	95.0	94.1
250	94.5	95.4	95.4	94.5	95.4	95.0	95.0	94.5
300	95.0	95.4	95.4	NR	95.4	95.4	95.0	NR
350	95.0	95.4	95.4	NR	95.4	95.4	95.0	NR
400	95.4	95.4	NR	NR	95.4	95.4	NR	NR
450	95.8	95.8	NR	NR	95.4	95.4	NR	NR
500	95.8	95.8	NR	NR	95.4	95.8	NR	NR

a Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

NR—No requirement

Table C405.8 (3)
Minimum Average Full Load Efficiency for Polyphase *Small Electric Motors*[a]

Open Motors			
Number of Poles ==>	**2**	**4**	**6**
Synchronous Speed (RPM)	**3600**	**1800**	**1200**
Motor Horsepower			
0.25	65.6	69.5	67.5
0.33	69.5	73.4	71.4
0.50	73.4	78.2	75.3
0.75	76.8	81.1	81.7
1	77.0	83.5	82.5
1.5	84.0	86.5	83.8
2	85.5	86.5	N/A
3	85.5	86.9	N/A

[a] Average full load efficiencies shall be established in accordance with 10 CFR 431.

Table C405.8 (4)
Minimum Average Full Load Efficiency for Capacitor-Start Capacitor-Run and Capacitor-Start Induction-Run *Small Electric Motors*[a]

Open Motors			
Number of Poles ==>	**2**	**4**	**6**
Synchronous Speed (RPM)	**3600**	**1800**	**1200**
Motor Horsepower			
0.25	**66.6**	**68.5**	**62.2**
0.33	**70.5**	**72.4**	**66.6**
0.50	**72.4**	**76.2**	**76.2**
0.75	**76.2**	**81.8**	**80.2**
1	**80.4**	**82.6**	**81.1**
1.5	**81.5**	**83.8**	**N/A**
2	**82.9**	**84.5**	**N/A**
3	**84.1**	**N/A**	**N/A**

[a] Average full load efficiencies shall be established in accordance with 10 CFR 431.

Add new definitions as follows:

GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE I): A motor which is designed in standard ratings with either:

1. Standard operating characteristics and standard mechanical construction for use under usual service conditions, such as those specified in NEMA MG1, paragraph 14.02, “Usual Service Conditions,” and without restriction to a particular application or type of application; or
2. Standard operating characteristics or standard mechanical construction for use under unusual service conditions, such as those specified in NEMA MG1, paragraph 14.03, “Unusual Service

Conditions," or for a particular type of application, and which can be used in most general purpose applications.

General purpose electric motors (subtype I) are constructed in NEMA T-frame sizes, or IEC metric equivalent, starting at 143T.

GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE II). A motor incorporating the design elements of a general purpose electric motor (subtype I) that is configured as one of the following:

1. A U-frame motor
2. A Design C motor
3. A close-coupled pump motor
4. A footless motor
5. A vertical, solid-shaft, normal-thrust motor (as tested in a horizontal configuration)
6. An 8-pole motor (900 rpm)
7. A polyphase motor with voltage of not more than 600 volts (other than 230 or 460 volts)

SMALL ELECTRIC MOTOR. A general purpose, alternating current, single speed induction motor.

Add new standard to Chapter 5 as follows:

DOE

10 CFR 431 Subpart B, App B, Uniform Test Method for Measuring Nominal Full Load Efficiency of Electric Motors.

NEMA National Electrical Manufacturers Association
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209

MG1-2011 Motors and Generators.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to electric motor efficiency provisions, an issue not currently addressed in the IECC Commercial Provisions. The change ensures continued consistency between the IECC and standard 90.1-2010 and addresses an important component associated with improving building energy efficiency.

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

C405.8-EC-FERGUSON.doc

Committee Action Hearing Results

For staff analysis of the content o*f* DOE 10CFR 431 Subpart B, App. B, and NEMA MG1-2011 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: While the proposal integrates federal standard which need to be complied with in the manufacturer of new equipment, placing this in the code will act to limit aftermarket use of existing equipment in new buildings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE331-13
Final Action: AS AM AMPC____ D

CE332-13
C405.8 (NEW), C405.8.1 (NEW)

Proposed Change as Submitted

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD)

Add new text as follows:

C405.8 Variable speed escalators and moving walks. Escalators and moving walks shall be capable of reducing their operating speed to no more than 15 feet per minute when no passengers have been detected for a period of time not exceeding three times the amount of time required to transfer a passenger between landings.

> **Exception:** A power factor controller that reduces operating voltage in response to light loading conditions is permitted to be provided in place of the variable speed function.

C405.8.1 Regenerative drive. An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

Reason: This proposal will result in reduced energy use and longer equipment life due to reduced wear and tear during the hours on standby mode or light loading conditions. These escalator controls have been standard in Canada, Europe and most of Asia for many years. The 2010 ANSI/ASME A17.1 safety standard for elevators and escalators now allows use of escalators and moving walks with "sleep mode" for reducing speed during unoccupied periods and provides for their safe operation. Sensors detect approaching passengers and bring the escalator or walk up to full speed before the passenger steps on. The 750-pound threshold for activation of the regenerative drive is derived from the 5-passenger threshold mentioned in manufacturers' literature (5 passengers x 150# = 750).

Energy savings:

The energy consumed by a typical pair of escalators is approximately 24,000 – 36,000 kWh per year, and the predicted energy savings ranges between 25% and 60%. The higher figure applies to escalators that have bursts of usage at wide intervals, as occurs with performing arts or transportation facilities. The lower figure would apply where usage is scattered throughout the day, as in shopping malls or office buildings. Annual savings per pair of escalators would equate to an energy cost savings of $600 - $2,140. The installed cost of escalators would typically increase by 1% - 4%, although one major manufacturer now includes these capabilities as standard for all escalators.

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

C405.8-EC-KRANZ.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this proposal was inferior to later items. The standard for this equipment needs to be referenced as shown in CE333-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**C405.8 Variable speed escalators and moving walks.** Escalators and moving walks shall be capable of reducing their operating speed to no more than 15 feet per minute when no passengers have been detected for a period of time not exceeding three times the amount of time required to transfer a passenger between landings.~~

> ~~**Exception:** A power factor controller that reduces operating voltage in response to light loading conditions is permitted to be provided in place of the variable speed function.~~

~~**C405.8.1**~~ **C405.8** **Regenerative drive.** An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

Commenter's Reason: A regenerative drive system for the "down" escalator supplies electricity back into the building's electrical system. If it becomes an IECC requirement, a regenerative drive system will be provided as a standard feature rather than a "special order" and costs will decrease. Regenerative drives are permitted by ASME A17.1 standard. As we explained in our original proposal, these systems can save as much as 60% of the energy used by an escalator.

Section C405.8 is proposed to be deleted because similar text was included in CE333-13 and was approved in Dallas. This public comment is proposed to be appended to CE333-13 if it is approved for the 2015 IECC.

CE332-13

Final Action: AS AM AMPC____ D

CE333-13
C405 (NEW), C405.1 (NEW), C405.2 (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C405 Vertical and horizontal transportation systems and equipment. Vertical and horizontal transportation systems and equipment shall comply with this section.

C405.1 Elevator cabs. For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be no less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.

C405.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

Add new standard to Chapter 5 as follows:

ASME

ASME/A17.1/CSA B44-2010 Safety Code for Elevators and Escalators

Reason: Energy is used in lighting and ventilating elevators when in operation and when not in operation. ASHRAE/IES Standard 90.1-2010, which is adopted by reference in the IECC Commercial Provisions, contains provisions to reduce the amount of energy used by elevators. This change ensures consistency between the IECC Commercial Provisions and standard 90.1 and owners/developers who choose to comply with standard 90.1 via the IECC are afforded this opportunity to save energy and reduce their operating costs.

Cost Impact: The code change proposal will increase the cost of construction if controls for ventilation on fans and systems are required.

C405 (NEW) #1-EC-FERGUSON.doc

Committee Action Hearing Results

For staff analysis of the content of ASME A17.1/CSA B44-2010 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The proposal will lead to energy savings. The industry has developed the acceptable methodologies and included them in the referenced standards. There was some concern that the threshold for application of this new provision was unclear.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall provide one of the following systems:

1. Automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers. or
2. A power factor controller that reduces electrical consumption in response to light loading conditions.

(*Balance of proposal is unchanged)*

Commenter's Reason: A power factor controller system is less expensive to install than a variable-speed escalator, and saves more energy where escalators are frequently in use by only a few people at a time. This is a common condition in office buildings and shopping malls. The variable speed escalator system, by contrast, is most energy-efficient for escalators that are heavily loaded in short bursts, followed by periods of complete inactivity. This is a common usage pattern in transportation and entertainment venues.

This public comment allows owners and designers to select the most appropriate power-saving system for each condition, rather than requiring one system type for all conditions. It reduces construction costs, saves more energy, and provides options for owners.

Public Comment 2:

Craig Conner, Building Quality; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Disapproval.

Commenter's Reason: Eleven approved ASHRAE proposals, listed below, lack a reason and substantiation. In order to evaluate proposals the I-code development process requires a reason and substantiation. Disapproval is requested on the following proposals due to a lack of reason and substantiation. The proposals are CE227, CE239, CE240, CE251, CE254, CE255, CE259, CE304, CE329, CE331, and CE333. (The first two proposals have a longer reason covering all eleven proposals.)

According to ICC's CP# 28-05 on "Code Development"

3.3.5.2 Reasons: *The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.*
3.3.5.3 Substantiation: *The proponent shall substantiate the proposed code change based on technical information and substantiation. …*

CE333-13

Final Action: AS AM AMPC____ D

CE337-13

C202 (New), C406.1, C406.2, Table C406.2(1), Table C406.2(2), Table C406.2(3), Table C406.2(4), Table C406.2(5), Table C406.2(6), Table C406.2(7), C406.3, C406.4, C406.5 (New), C406.6 (New), C406.8 (New), C406.8.1 (New)

Proposed Change as Submitted

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com), Jim Edelson, New Buildings Institute

Revise as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment ~~performance~~ in accordance with Section C406.2.
2. Reduced ~~efficient~~ lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

C406.2. More efficient HVAC equipment performance. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through 403.2.3(7) by 10 percent in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. *Variable refrigerant flow systems* shall exceed the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 by 10 percent. Equipment not listed in Tables C403.2.3(1) through 403.2.3(7) shall be limited to 10 percent of the total building system capacity.

~~TABLE C406.2(1)~~
~~UNITARY AIR CONDITIONERS AND CONDENSING UNITS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY[a]~~	
			~~CLIMATE ZONES 1 - 5~~	~~CLIMATE ZONES 6 - 8~~
~~Air conditioners, air cooled~~	~~< 65,000 Btu/h~~	~~Split system~~	~~15.0 SEER~~ ~~12.5 EER~~	~~14 SEER~~ ~~12 EER~~
		~~Single package~~	~~15.0 SEER~~ ~~12.0 EER~~	~~14.0 SEER~~ ~~11.6 EER~~
	~~≥ 65,000 Btuh/h and < 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 EER[b]~~ ~~12.54 IEER[b]~~	~~11.5 EER[b]~~ ~~12.0 IEER[b]~~
	~~≥ 240,000 Btu/h and < 760,000 Btu/h~~	~~Split system and single package~~	~~10.8 EER[b]~~ ~~11.3 IEER[b]~~	~~10.5 EER[b]~~ ~~11.0 IEER[b]~~
	~~≥ 760,000 Btu/h~~	—	~~10.2 EER[b]~~ ~~10.7 IEER[b]~~	~~9.7 EER[b]~~ ~~10.2 IEER[b]~~
~~Air conditioners, water and evaporatively cooled~~	—	~~Split system and single package~~	~~14.0 EER~~	~~14.0 EER~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~

~~a. IEERs are only applicable to equipment with capacity modulation.~~
~~b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.~~

~~TABLE C406.2(2)~~
~~UNITARY AND APPLIED HEAT PUMPS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY~~[a]	
			~~CLIMATE ZONES 1 - 5~~	~~CLIMATE ZONES 6 - 8~~
~~Air cooled (Cooling mode)~~	~~< 65,000 Btu/h~~	~~Split system~~	~~15.0 SEER, 12.5 EER~~	~~14.0 SEER, 12.0 EER~~
		~~Single package~~	~~15.0 SEER, 12.0 EER~~	~~14.0 SEER 11.6 EER~~
	~~≥ 65,000 Btu/h and < 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 SEER, 12.4 EER~~	~~11.5 EER~~[b]~~, 12.0 IEER~~[b]
	~~≥ 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 SEER, 12.4 EER~~	~~10.5 EER~~[b]~~, 10.5 IEER~~[b]
~~Water sources (Cooling mode)~~	~~< 135,000 Btu/h~~	~~85°F entering water~~	~~14.0 EER~~	~~14.0 EER~~
~~Air cooled (Heating mode)~~	~~< 65,000 Btu/h (Cooling capacity)~~	~~Split system~~	~~9.0 HSPF~~	~~8.5 HSPF~~
		~~Single package~~	~~8.5 HSPF~~	~~8.0 HSPF~~
	~~≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling capacity)~~	~~47°F db/43°F wb outdoor air~~	~~3.4 COP~~	~~3.4 COP~~
		~~17°F db/15°F wb outdoor air~~	~~2.4 COP~~	~~2.4 COP~~
	~~≥ 135,000 Btu/h (Cooling capacity)~~	~~47°F db/43°F wb outdoor air~~	~~3.2 COP~~	~~3.2 COP~~
		~~77°F db/15°F wb outdoor air~~	~~2.1 COP~~	~~2.1 COP~~
~~Water sources (Heating mode)~~	~~< 135,000 Btu/h (Cooling capacity)~~	~~70°F entering water~~	~~4.6 COP~~	~~4.6 COP~~

~~For SI: °C = [(°F) - 32] / 1.8, 1 British thermal unit per hour = 0.2931 W.~~
~~db = dry-bulb temperature, °F; wb = wet-bulb temperature, °F.~~
~~a. IEERs and Part load rating conditions are only applicable to equipment with capacity modulation.~~
~~b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.~~

~~TABLE C406.2(3)~~
~~PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINALHEAT PUMPS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~MINIMUM EFFICIENCY~~
~~Air conditioners and heat pumps (cooling mode)~~	~~< 7,000 Btu/h~~	~~11.9 EER~~
	~~7,000 Btu/h and < 10,000 Btu/h~~	~~11.3 EER~~
	~~10,000 Btu/h and ≤ 13,000 Btu/h~~	~~10.7 EER~~
	~~> 13,000 Btu/h~~	~~9.5 EER~~

~~TABLE C406.2(4)~~
~~WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS, WARM AIR DUCT FURNACES AND UNIT HEATERS, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY (INPUT)~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY~~	~~TEST PROCEDURE~~
~~Warm air furnaces, gas fired~~[a]	~~< 225,000 Btu/h~~	~~—~~	~~For Climate Zones 1 and 2 NR~~	~~DOE 10 CFR Part 430 or ANSI Z21.47~~
			~~For Climate Zones 3 and 4 90 AFUE or 90~~ ~~E_t~~[c]	
			~~For Climate Zones 4 – 8 92 AFUE or 92~~ ~~E_t~~[c]	
	~~≥ 225,000 Btu/h~~	~~Maximum capacity~~	~~90% E_c~~[b]	~~ANSI Z21.47~~
~~Warm air furnaces, oil fired~~[a]	~~< 225,000 Btu/h~~	~~—~~	~~For Climate Zones 1 and 2 NR~~	~~DOE 10 CFR Part 430 or UL 727~~
			~~For Climate Zones 3 – 8 85 AFUE or 85~~ ~~E_t~~[c]	
	~~≥ 225,000 Btu/h~~	~~Maximum capacity~~	~~85% E_t~~[b]	~~UL 727~~
~~Warm air duct furnaces, gas fired~~[a]	~~All capacities~~	~~Maximum capacity~~	~~90% E_c~~	~~ANSI Z83.8~~
~~Warm air unit heaters, gas fired~~	~~All capacities~~	~~Maximum capacity~~	~~90% E_c~~	~~ANSI Z83.8~~
~~Warm air unit heaters, oil fired~~	~~All capacities~~	~~Maximum capacity~~	~~90% E_c~~	~~UL 731~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~

~~E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).~~

a. ~~Efficient furnace fan: Fossil fuel furnaces in climate zones 3 to 8 shall have a furnace electricity ratio not greater than 2 percent and shall include a manufacturer's designation of the furnace electricity ratio.~~

b. ~~Units shall also include an IID (intermittent ignition device), have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.~~

c. ~~Where there are two ratings for units not covered by NAECA (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]), units shall be permitted to comply with either rating.~~

~~TABLE C406.2(5)~~
~~BOILER, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~FUEL~~	~~SIZE CATEGORY~~	~~TEST PROCEEDURE~~	~~MINIMUM EFFICIENCY~~
~~Steam~~	~~Gas~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~83% AFUE~~
		~~> 300,000 Btu / h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~81% E_t~~
		~~>2.5 m Btu/h~~		~~82% E_c~~
	~~Oil~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~85% AFUE~~
		~~> 300,000 Btu/h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~83% E_t~~

~~EQUIPMENT TYPE~~	~~FUEL~~	~~SIZE CATEGORY~~	~~TEST PROCEEDURE~~	~~MINIMUM EFFICIENCY~~
		~~>2.5 m Btu/h~~		~~84% E_c~~
~~Hot water~~	~~Gas~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~97% AFUE~~
		~~> 300,000 Btu/h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~97% E_t~~
		~~>2.5 m Btu/h~~		~~94% E_c~~
	~~Oil~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~90% AFUE~~
		~~> 300,000 Btu/h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~88% E_t~~
		~~>2.5 m Btu/h~~		~~87% E_c~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~
~~E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).~~

~~TABLE C406.2(6)~~
~~CHILLERS—EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~UNITS~~	~~MINIMUM EFFICIENCY[a] (I-P)~~				~~Test Procedure[b]~~
			~~Path A~~		~~Path B[c]~~		
			~~Full Load~~	~~IPLV~~	~~Full Load~~	~~IPLV~~	
~~Air-cooled chillers with condenser, electrically operated~~	~~< 150 tons~~	~~EER~~	~~10.000~~	~~12.500~~	~~NA~~	~~NA~~	~~AHRI 550/590[f]~~
	~~≥ 150 tons~~	~~EER~~	~~10.000~~	~~12.750~~	~~NA~~	~~NA~~	
~~Air-cooled without condenser, electrical operated~~	~~All capacities~~	~~EER~~	~~Condenserless units shall be rated with matched condensers~~				~~AHRI 550/590[f]~~
~~Water-cooled, electrically operated, positive displacement (reciprocating)~~	~~All capacities~~	~~kw/ton~~	~~Reciprocating units required to comply with water cooled positive displacement requirements~~				~~AHRI 550/590[f]~~
~~Water-cooled electrically operated, positive displacement~~	~~< 75 tons~~	~~kw/ton~~	~~0.780~~	~~0.630~~	~~0.800~~	~~0.600~~	~~AHRI 550/590[f]~~
	~~≥ 75 tons and < 150 tons~~	~~kw/ton~~	~~0.775~~	~~0.615~~	~~0.790~~	~~0.586~~	
	~~≥ 150 tons and < 300 tons~~	~~kw/ton~~	~~0.680~~	~~0.580~~	~~0.718~~	~~0.540~~	
	~~≥ 300 tons~~	~~kw/ton~~	~~0.620~~	~~0.540~~	~~0.639~~	~~0.490~~	
~~Water-cooled electrically operated, centrifugal[d]~~	~~< 150 tons~~	~~kw/ton~~	~~0.634~~	~~0.596~~	~~0.639~~	~~0.450~~	~~AHRI 550/590[f]~~
	~~≥ 150 tons and < 300 tons~~	~~kw/ton~~	~~0.634~~	~~0.596~~	~~0.639~~	~~0.450~~	
	~~≥ 300 tons and < 600 tons~~	~~kw/ton~~	~~0.576~~	~~0.549~~	~~0.600~~	~~0.400~~	
	~~≥ 600 tons~~	~~kw/ton~~	~~0.570~~	~~0.539~~	~~0.590~~	~~0.400~~	
~~Air-cooled absorption single effect[e]~~	~~All capacities~~	~~COP~~	~~0.600~~	~~NR~~	~~NA~~	~~NA~~	~~AHRI 560~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~UNITS~~	~~MINIMUM EFFICIENCY[a] (I-P)~~				~~Test Procedure[b]~~
			~~Path A~~		~~Path B[c]~~		
			~~Full Load~~	~~IPLV~~	~~Full Load~~	~~IPLV~~	
~~Water-cooled absorption single effect[e]~~	~~All capacities~~	~~COP~~	~~0.700~~	~~NR~~	~~NA~~	~~NA~~	
~~Absorption double effect indirect-fired~~	~~All capacities~~	~~COP~~	~~1.000~~	~~1.050~~	~~NA~~	~~NA~~	
~~Absorption double effect direct fired~~	~~All capacities~~	~~COP~~	~~1.000~~	~~1.000~~	~~NA~~	~~NA~~	

~~For SI: 1 Ton = 3516 W.~~

~~NA = Not applicable and cannot be used for compliance. NR = No minimum requirements.~~

~~a. Compliance with this standard can be obtained by meeting the minimum requirements of Path A or Path B. However both the full load and IPLV shall be met to fulfill the requirements of Path A and Path B.~~

~~b. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.~~

~~c. Path B is intended for applications with significant operating time at part load. All Path B machines shall be equipped with demand limiting capable controls.~~

~~d. The chiller equipment requirements do not apply for chillers used in low-temperature applications where the design leaving fluid temperature is greater than 40°F.~~

~~e. Only allowed to be used in heat recovery applications.~~

~~f. Packages that are not designed for operation at ARI Standard 550/590 test conditions (and, thus, cannot be tested to meet the requirements of Table C-3) of 44°F leaving chilled-water temperature and 85°F entering condenser-water temperature with 3 gpm/ton condenser-water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using the following equation:~~

~~Adjusted maximum full load kW/ton rating = (full load kW/ton from Table C-3)/~~K_{adj}

~~Adjusted maximum NPLV rating = (IPLV from Table C-3)/~~K_{adj}

~~where:~~

K_{adj} = 6.174722 – 0.303668(X) + 0.00629466(X)^2 – 0.000045780(X)^3

X = DT_{std} + LIFT (°F)

DT_{std} = [(24 + (full load kW/ton from Table C-3) × 6.83)]/flow (°F)

~~Flow = condenser-water flow (gpm) / cooling full load capacity (tons)~~

~~LIFT = CEWT – CLWT (°F)~~

~~CEWT = full load entering condenser-water temperature (°F)~~

~~CLWT = full load leaving chilled-water temperature (°F)~~

~~The adjusted full load and *NPLV* values are only applicable over the following full-load design ranges:~~

~~Minimum leaving chilled-water temperature: 38°F~~

~~Maximum condenser entering water temperature: 102°F~~

~~Condenser-water flow: 1 to 6 gpm/ton~~

X ≥ 39°F and ≤60°F

~~TABLE C406.2(7)~~
~~ABSORPTION CHILLERS—EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~MINIMUM EFFICIENCY FULL LOAD COP (IPLV)~~
~~Air cooled, single effect~~	~~0.60, allowed only in heat recovery applications~~
~~Water cooled, single effect~~	~~0.70, allowed only in heat recovery applications~~
~~Double effect – direct fired~~	~~1.0 (1.05)~~
~~Double effect – indirect fired~~	~~1.20~~

C406.3 Reduced lighting power density The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values in Table C405.5.2(1)~~the reduced whole building interior lighting power in Table C406.3~~ times the floor area of the building types~~.~~ or by using 90 percent of the interior lighting power allowance calculated by the Space by Space method in section C405.5.2.

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls which shall be located, scheduled, and operated in accordance with Section C405.2.2.

1. Luminaires shall be capable of continuous dimming.
2. Luminaires shall be capable of being addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of no more than 4 luminaries shall be allowed.
3. No more than 8 luminaires shall be controlled together in a *daylight zone*
4. Fixtures shall be controlled through a digital control system that includes the following function:
   - 1.1. Control reconfiguration based on digital addressability
   - 1.2. Load shedding
   - 1.3. Individual user control of overhead general illumination in open offices
   - 1.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of Section C406.4.
6. Functional testing of lighting controls shall comply with Section 408.

~~C406.4~~ C406.5 On-site renewable energy Total minimum ratings of on-site renewable energy systems shall comply with one of the following:

1. Provide not less than 1.75 btu's, or not less than 0.50 watts, per square foot of conditioned floor area.
2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4;

C406.6 Dedicated outdoor air system. Buildings covered by Section C403.4 shall be equipped with an independent ventilation system designed to provide no less than the minimum 100 percent outdoor air to each individual occupied space as specified by the *International Mechanical Code*, to each individual occupied space. The ventilation system shall be capable of total energy recovery. The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

C406.7 Reduced energy use in service water heating. Buildings shall be of the following types to use this compliance method:

1. Group R-1, Boarding houses, Hotels or motels;
2. Group I-2, Hospitals, mental hospitals, and nursing homes;
3. Group A-2, Restaurants and Banquet halls or buildings containing food preparation areas;
4. Group F, Laundries;
5. Group R-2 Buildings with residential occupancies;
6. Group A-3 Health clubs and spas; or
7. Buildings showing a service hot water load of 10 percent or more of total building energy loads as shown with an energy analysis as described in Section C407.

C406.7.1 Load fraction. The building service water heating system shall have one or more of the following that are sized to provide at least 60 percent of hot water requirements, or sized to provide 100 percent of hot water requirements if the building must otherwise comply with Section C403.4.6:

1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or a combined heat and power system.
2. Solar water heating systems.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

VARIABLE REFRIGERANT FLOW SYSTEM. An engineered direct expansion (DX) refrigerant system that incorporates a common condensing unit, at least one variable capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and common communications network. Variable refrigerant flow utilizes three or more steps of control on common inter-connecting piping.

Reason: This proposal increases the number of optional packages in the IECC from three to six for compliance with Section C406, in addition to the modeling options available both in Section 507 of the IECC and the Energy Cost Budget method of ASHRAE 90.1. The purpose of this section is to provide flexibility for compliance, and to recognize that all buildings may not be able to meet higher levels of efficiency in today's prescriptive model codes without providing options. The specifications included in the six approximately equal energy packages were based on preliminary modeling done by New Buildings Institute.

HVAC

The equipment tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements. This will ensure that the HVAC equipment efficiency levels contained in this section provide the necessary energy savings over equipment efficiencies contained in Section C403. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The proposed option limits the use of heating and cooling equipment not listed in the C403 tables to no more than 10% of the total building capacity. This would allow some systems, e.g. electric resistance heat, to be used in a limited capacity for the proposed project and still allow the code user to use this option. Under the 2012 IECC all systems must comply with the equipment efficiency requirements.

LPD

The LPD tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements for whole building or space-by-space. This will ensure that the LPD levels contained in this section provide the necessary energy savings over the LPDs contained in Section C405. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The 2012 IECC Additional Package Options only allowed whole building LPDs to be used. This proposal allows the use of space-by-space LPDs to provide more flexibility to the code user thereby increasing the viability of this option. The values proposed in this section are similar to those included as part of ASHRAE Standard 189.1.

The renewable option has not been modified from the 2012 IECC and provides three straightforward compliance approaches: electricity generation, thermal collection, and a calculation method for any type or combination of energy production. A path to include purchase of renewable power or credits was carefully considered, but not included based on concerns regarding verification and permanence of the transaction after the certificate of occupancy has been issued.

The Dedicated Outdoor Air System package is based on technical specifications from the 50% Technical Support Documents of the Pacific Northwest National Lab. The measure requires that adequate quantity of outside air is delivered separately to spaces in the buildings while employing 100% energy recovery. This reduces the need for excess outdoor air or supply air, and uses less energy for terminal reheating.

The Enhanced Lighting Controls Package provides a non-LPD lighting alternative package requires a digital control system to allow continuous dimming and a significant level of controllability on individual luminaires, or groups of no more than eight luminaires.

The Service Water Heating Package language is modified from similar language in the IgCC and the 2012 North Carolina commercial code. The requirements for use of waste energy to heat service hot water are in excess of what is otherwise required in Section C403 of the IECC, when applicable. Solar thermal water heating systems may also be used. This package is independent of the package offered in Section C406.5 since only one package is required for compliance with Section 406 in total.

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

C406.1-EC-EDELSON-MAKELA.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal both simplifies the provisions for additional efficiency packages and increases the options open to designers of each building. The existing tables have known flaws and replacing the HVAC proposal with a simple percentage increase in savings increases flexibility.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group; Jim Edelson, New Buildings Institute, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402, C403, C404 and C405. In addition, commercial buildings shall comply with ~~either~~ Section ~~C406.2, C406.3 or C406.4~~ Section C406, and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

~~Individual tenant spaces shall comply with either Section C406.2 or Section C406.3 unless documentation can be provided that demonstrates compliance with Section C406.4 for the entire building.~~

C406.1.1 Tenant Spaces. Tenant spaces shall comply with Section C406.2, C406.3, C406.4, C406.6 or C406.7. Alternatively tenant spaces shall comply with Section C406.5 when the entire building is in compliance.

~~**C406.3 Efficient Lighting System** Whole building lighting power density shall comply with the requirements of Section C406.3.1.~~

~~**C 406.3.1**~~ **C406.3 Reduced lighting power density** The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values in Table C405.5.2(1) times the floor area of the building types or by using 90 percent of the interior lighting power allowance calculated by the Space by Space method in section C405.5.2.

~~**TABLE C406.3**~~
~~**REDUCED INTERIOR LIGHTING POWER**~~

Commenter's Reason: CE 337 was Approved as Submitted because it was recognized to simplify the provisions, increase flexibility by providing more options for compliance, and eliminating tables with errors.

A few technical and editorial issues were brought to the attention of the Proponents. This Comment accomplishes three objectives in addressing those issues:

1. Corrects the pointer language in C401.2
2. Clarifies and updates the Tenant Space application language in C406.1.1
3. Deletes orphaned language in 406.3 and renumbers accordingly.

Public Comment 2:

Steve Rosenstock, Edison Electric Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment ~~performance~~ in accordance with Section C406.2.

2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

C406.1.1. Tenant spaces. Except where an entire building is in compliance with Section C406.5, individual tenant spaces shall comply with either Section C406.2 or Section C406.3.

C406.2 More efficient HVAC equipment performance. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through C403.2.3(7) by ~~10~~ 3 percent in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by ~~10~~ 3 percent. *Variable refrigerant flow systems* shall exceed the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 by ~~10~~ 3 percent. Equipment not listed in Tables C403.2.3(1) through C403.2.3(7) shall be allowed ~~limited~~ to meet ~~10~~ 100 percent of the total building system capacity.

C406.3 Efficient lighting system. Whole building lighting power density (Watts/sf) shall comply with the requirements of Section C406.3.1.

C406.3.1 Reduced lighting power density. The total interior lighting power (watts) of the building shall be determined by using ~~90~~ 97 percent of the lighting power values in Table C405.4.2(1) times the floor area for the building types or by using ~~90~~ 97 percent of the interior lighting power allowance calculated by the Space by Space method in Section C405.4.2.

C406.5 On-site renewable energy. Total minimum ratings of on-site renewable energy systems shall comply with one of the following:

1. Provide not less than 1.7~~5~~1 Btu ~~(1850 W)~~, or not less than 0.50 watts per square foot (5.4 W/m^2) of conditioned floor area.

2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4.

C406.7 Reduced energy use in service water heating. Buildings shall be designed to reduce service hot water usage by at least 3 percent. ~~of the following types to use this compliance method:~~

~~1. Group R-1, Boarding houses, hotels or motels.~~

~~2. Group I-2, Hospitals, mental hospitals, and nursing homes.~~

~~3. Group A-2, Restaurants and banquet halls or buildings containing food preparation areas.~~

~~4. Group F, Laundries.~~

~~5. Group R-2 Buildings with residential occupancies.~~

~~6. Group A-3 Health clubs and spas.~~

~~7. Buildings showing a service hot water load of 10 percent or more of total building energy loads as shown with an energy analysis as described in Section C407.~~

~~**(CE337-13 AS)**~~
~~**C406.7.1 Load fraction.** The building service water heating system shall have one or more of the following that are sized to provide at least 60 percent of hot water requirements, or sized to provide 100 percent of hot water requirements if the building shall otherwise comply with Section C403.4.7:~~

~~1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or a combined heat and power system.~~

~~2. Solar water heating systems.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The proposed modifications will improve this section in the following ways:

- Equivalence of effort. The threshold for all systems will be the same.
- The values are more realistic, especially when considering that the code development committee approved many measures that will increase the energy efficiency of all commercial buildings in the areas of lighting, envelope, heating equipment efficiency, cooling equipment efficiency, motor efficiency, transformer efficiency, exhaust system efficiency, commercial refrigeration efficiency, and controls (for lighting and mechanical equipment). All of these increases "raised the floor" of efficiency by a significant amount. In fact, it is very likely that it is not possible to improve efficiency by even 4% for many systems.
- For water heating, all buildings will be eligible to use this option, not just some buildings.

- Design and equipment flexibility. The code should not restrict the types of technologies that can be used to improve efficiency. There are options not shown in the tables (thermal energy storage, gas-fired heat pumps, zoned electric systems, etc.) that could meet the additional efficiency requirements. Restricting other or new technologies to 10% of building capacity is inflexible, arbitrary, and not consistent with the goals of this section.

Public Comment 3:

Jeremiah Williams, U.S. Department of Energy, request Approval as Modified by this Public Comment.

Modify proposal as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment in accordance with Section C406.2.
2. Reduced lighting power density ~~system~~ in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

C406.1.1. Tenant spaces. Except where an entire building is in compliance with Section C406.5, individual tenant spaces shall comply with either Section C406.2 or Section C406.3.

C406.2 More efficient HVAC equipment performance. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through C403.2.3(7) by 10 percent in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. Variable refrigerant flow systems shall exceed the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 by 10 percent. Equipment not listed in Tables C403.2.3(1) through C403.2.3(7) shall be limited to 10 percent of the total building system capacity.

C406.3 ~~Efficient lighting system.~~ ~~Whole building lighting power density (Watts/sf) shall comply with the requirements of Section C406.3.1.~~

~~C406.3.1~~ Reduced lighting power density. The total interior lighting power (watts) of the building shall ~~be determined by using~~ <u>not exceed</u> 90 percent of the lighting power <u>resulting from multiplying the</u> values in Table C405.5.2.1 (1) times the floor area of the <u>applicable</u> building type<u>(s)</u> or by using 90 percent of the interior lighting power allowance <u>as</u> calculated <u>in accordance with</u> ~~by~~ the Space-by-Space method in Section C405.5.2. <u>For the purposes of this option the determination of areas and their application to building type(s) shall be in accordance with Section C405.5.2.</u>

(Portions of proposal not shown remain unchanged)

Commenter's Reason: During the code development hearing, CE335-13 was heard after CE337-13 and, based on the action taken on CE337-13, DOE asked for disapproval of CE335-13. DOE is submitting this public comment to address the issue contained in CE335-13. While the current code advises how to determine the reduced lighting power density, it is not clear that the code actually requires the building to comply with the resultant LPD. This public comment ensures the changes approved in CE337-13 are retained, but corrects the issue regarding the lack of a specific requirement in Section C406.3 that the LPD determined per the code must actually be met. In addition, this public comment addresses a small editorial change needed in Section C406.1.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. <u>EERE-2012-BT-BC-0030</u>) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Public Comment 4:

Gary MacFadden, representing The National Electrical Manufacturers Association, requests Disapproval.

Commenter's Reason: CE337 adds requirements to section 406 of the commercial provisions of the IECC. By the proponents own admission, the proposal would increase the optional paths to compliance from 3 to 6.

Alternative paths to compliance are good, but doubling the number of paths will lead to confusion for code enforcers especially when there has not been any cry out by the consuming public about the current 3 options being too inflexible.

Public Comment 5:

Chuck Foster, C.R. Foster, representing self; requests Disapproval.

Commenter's Reason: This is trying to fix a problem that doesn't exist. There are already 3 options for users in Section 406. This proposal would add three more – doubling the size of the section.

Consumers of this code have not complained that section 406 is too rigid or that they need more flexibility for that section. Where does this stop; we now have 6 optional paths, should we go for 17 paths, or 66 paths, or ….

Sec 406 is a relatively new section – we should give consumers time to digest it before we go making changes. Urge disapproval.

CE337-13

Final Action: AS AM AMPC____ D

CE340-13
C406.3, Table C406.3, C406.3.1

Proposed Change as Submitted

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glen@lampartners.com)

Revise as follows:

C406.3 ~~**Efficient lighting system.** Whole building lighting power density (Watts/sf) shall comply with the requirements of Section C406.3.1.~~ **Reduced lighting power density.** The lighting power allowance shall be 90 percent of the lighting power allowance determined according to Section C405.5.2.

~~**C406.3.1 Reduced lighting power density.** The total interior lighting power (watts) of the building shall be determined by using the reduced whole building interior lighting power in Table C406.3 times the floor area for the building types.~~

~~TABLE C406.3~~
~~REDUCED INTERIOR LIGHTING POWER~~

Reason: Simplify and clarify the code. Allow proper design flexibility without reducing stringency.
As currently written, this option only allows the use of Building Area Method lighting power densities according to the values in table C406.3, which are 10% below base code. This prevents the designer from using the space-by-space method to determine the lighting power allowance for this additional efficiency option. This proposal simply requires a 10% reduction in the lighting power from what is allowed in base code. It does not change stringency and it simplifies the code. Also it means that whenever the base code LPD values are updated, no changes to this option will need to be made. No table will need to be revised.

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

C406.3-EC-HEINMILLER.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Addressed with the approval of CE337-13. This change is not needed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Submitted.

Commenter's Reason: The contents of this proposal are included in proposal CE337. Proposal CE337 was Approved as Submitted by the Committee. This proposal, CE340, was subsequently Disapproved because it is contained in CE337. If CE337 receives Public Comments and is heard at the Public Comment Hearings and is disapproved or significantly modified, then this proposal CE340 needs to be Approved as Submitted so its provision can be incorporated into the code, independent of CE337's fate.

CE340-13
Final Action: AS AM AMPC____ D

CE343-13
C407.2, C407.2.1 (NEW)

Proposed Change as Submitted

Proponent: Brian Dean, ICC International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C407.2 Mandatory requirements. Compliance with this section requires that the criteria of Sections C402.4, C403.2, C404<u>,</u> ~~and~~ C405 <u>and C407.2.1</u> be met.

<u>**C407.2.1 Maximum fenestration U-factor and SHGC for compliance based on total building performance (Mandatory).** For buildings complying with Section C407, the area-weighted average U-factor permitted for products within each fenestration product category listed in Table C402.3 shall not exceed the applicable U-factor specified in Table C402.3 by more than 25 percent. For buildings complying with Section C407, the area-weighted average SHGC permitted for products within each fenestration product category listed Table C402.3 shall not exceed the applicable SHGC specified in Table C402.3 by more than 50 percent.</u>

Reason: The purpose of the proposed code change is to establish new maximum trade-off limits for fenestration under the commercial performance path. This proposal imports, from the residential *IECC* provisions, an effective backstop on fenestration trade-offs that has been in the *IECC* since 2004, but with some additional modifications and improvements. This new provision will ensure that modern, highly efficient commercial buildings are required to have at least moderately efficient windows:

- New section C407.2.1 would ensure that whenever the simulated performance alternative is used, the windows on a weighted average basis will meet a reasonable level of efficiency (no worse than 25% greater U-factor and 50% greater SHGC than the prescriptive requirements).
- The main difference between this new commercial section and the existing residential trade-off backstop is that the proposed provision would cap trade-offs at a percentage of the U-factor and SHGC requirements as they change over time rather than setting specific maximum values (we are also proposing to change the residential provision to the same approach).
- This approach will allow the cap to slide up or down to match future changes to the U-factor and SHGC requirements, while still ensuring that buildings are designed and constructed with windows that fall within a reasonable range of efficiency.

The fenestration trade-off limits currently found in the residential chapter of the *IECC* are simple, mandatory measures that ensure all new buildings contain high-quality, cost-effective windows that save energy, provide reasonable comfort, resist condensation in colder climates and block unwanted solar gain in warmer climates. Without the protection of this backstop, fenestration values could be traded away to levels unacceptable in modern building practice. Given the improvements to window efficiency brought about by the 2012 IECC and our nation's high priority for energy efficiency, this proposal is a common-sense extension of an effective code requirement.

- **Simple compliance.** The residential fenestration maximums are effective and easy to understand. These requirements have been successfully applied for the last several years. All states that have already adopted the 2006, 2009, and 2012 *IECC* have adopted these maximums to residential construction. On the residential side, they are also already seamlessly built into compliance software such as the Department of Energy's REScheck. The same approach would work for commercial building compliance software.
- **Flexible standard.** The area-weighted average approach embodied in the fenestration maximums allows considerable flexibility for the use of decorative glass, glass block, and other fenestration products, while maintaining a baseline performance for the building's overall glazing. In short, not all products are required to individually meet the maximum values; only the area-weighted average of all products in the building are required to meet the maximum values specified in this code provision.
- **Quality windows, energy savings and peak demand savings nationwide**. The fenestration maximums encourage the use of cost-effective energy-efficient windows nationwide. Because good windows reduce energy consumption both during peak cooling times in the summer months and during peak heating hours in the winter months, such windows can help reduce the strain on the electric grid and natural gas pipeline system and delay the need to build expensive peaking facilities. By reducing the trade-off of efficient windows for other measures, the maximums will better capture the benefits

of blocking solar gain and providing reasonable insulating value such as peak reduction, reduced cooling system sizes and year-round comfort. Consumers will also enjoy the reduced costs that come with economies of scale and market transformation.

- **More comfortable buildings and less energy use.** Incremental changes in window efficiency can have a huge impact on occupant comfort because even the most efficient windows are, at best, still only the equivalent of about an R-3 wall in the winter. Moreover, unlike the opaque wall, even the best fenestration allows substantial summer solar heat gain into the conditioned space. Hot spots created by high solar gain in the summer and/or cold or drafty glass in the winter months can force an occupant to adjust the thermostat to compensate. A good window will provide reasonable insulating value, keeping occupants more comfortable during the coldest months. Similarly, windows with low SHGC will protect against hot spots and occupant discomfort, and will make it less likely that occupants will need to adjust the thermostat and use more energy.

For a more detailed discussion of the benefits of good fenestration, see the section on the benefits of efficient windows on the website of the Efficient Windows Collaborative -- http://www.efficientwindows.org/benefits.cfm.
The fenestration maximums have served an important role in ensuring residential energy efficiency for many years. We recommend that the fenestration maximums in the residential chapter of the *IECC* be duplicated, with the appropriate modifications, in the commercial chapter of the *IECC*.

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

C407.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal would put an artificial restriction on the performance path methodology. Such runs counter to the intent of the performance path option and restricts the flexibility of the design professional.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeff Inks, Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: We are urging approval as submitted for the reasons stated by the proponents in the proposal. WDMA supports establishing reasonable trade-off caps under the performance path to ensure an unlimited reduction in fenestration efficiency is not permitted. We do not believe the 25% variance allowed for U-factors and 50% for SHGC is either an artificial restriction or presents unreasonable design restrictions. In addition, we believe establishing the caps as a percentage of the respective prescriptive requirements is also a much more sensible approach than prescribing specific values because it alleviates the need for additional revisions to the cap values when prescriptive requirements are amended.

We believe this proposal will result in a significant improvement in the IECC and we therefore urge approval as submitted.

CE343-13
Final Action: AS AM AMPC____ D

CE344-13
C407.3.1 (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Mark Nowak, M. Nowak Consulting, LLC, representing Steel Framing Alliance

Add new text as follows:

C407.3.1 Alternative to proposed design. A representative building as described in NREL/TP-5500-46861 or other representative buildings approved by the code official shall be permitted to be used in lieu of the actual building design.

Add new standard to Chapter 5 as follows:

DOE

NREL/TP-5500-46861-11 Commercial Reference Building Models of the National Building Stock

Reason: This proposal will simplify the implementation of the code by allowing a representative building to be used for compliance rather than the actual building. Designers will only need to build a model for the representative building for a given climate zone. Likewise, simulation tool developers would be able to provide the buildings in library files for users. However, it will still leave the designer the option to comply with the actual propose building.

This represents a significant deviation from past and current practice but it is a logical step for the IECC to take. Given that the representative buildings are the basis for the current prescriptive requirements, they should be permitted to be used repeatedly for building design and compliance. This approach would allow the development of multiple prescriptive solutions equivalent to those in the code without cluttering up the code with pages of additional text.

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

Analysis: A review of the standard proposed for inclusion in the code, DOE-NREL/TP-5500-46861-2011 Commercial Reference Building Models of the National Building Stock, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

C407.3.1 (NEW)-EC-NOWAK.doc

Committee Action Hearing Results

For staff analysis of the content of DOE NREL/TP-5500-46861-11 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval because the current proposal doesn't reflect his original intent..

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mark Nowak, M. Nowak Consulting, LLC, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C407.3.1 Alternative to proposed design. A representative building <u>with the size, shape, floor plan, fenestration area, and opaque envelope area</u> as described in NREL/TP-5500-46861 or other representative buildings approved by the code official shall be permitted to be used in lieu of the actual building design. <u>All other specifications for the proposed and standard reference designs shall comply with the requirements of this code.</u>

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This proposal will simplify the implementation of the code by allowing a representative building to be used for compliance rather than the actual building. Designers will only need to build a model once for the representative building for a given climate zone. Likewise, simulation tool developers would be able to provide the buildings in library files for users. However, it will still leave the designer the option to comply using the actual proposed building. This will make the use of the performance option more flexible by offering a less complex option for compliance.

This represents a significant deviation from past and current practice but it is a logical step for the IECC to take. Given that the representative buildings are the basis for the current prescriptive requirements, they should be permitted to be used repeatedly for building design and compliance. This approach would allow the development of multiple prescriptive solutions equivalent to those in the code without cluttering up the code with pages of additional text.

As the proponent of the original proposal, we asked for disapproval after a ruling by the committee chair that a modification was out of order. The modification shown here brings the proposal in line with our original intent by specifying that the proposed building's geometry, fenestration area, and opaque areas must match the representative building. All other requirements of the code will still be required to be met.

CE344-13

Final Action: AS AM AMPC____ D

CE350-13
C408

Proposed Change as Submitted

Proponent: Richard Grace, Fairfax County Government, representing The Virginia Plumbing and Mechanical Inspectors Association, The Virginia Building Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Revise as follows:

~~Section C408~~
APPENDIX A
SYSTEM COMMISSIONING

~~C408.1~~ AC 101.1 General. This ~~section~~ appendix covers the commissioning of the building mechanical systems in Section C403 and electrical power and lighting systems in Section C405.

~~C408.2~~ AC 101.2 Mechanical systems commissioning and completion requirements. Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this ~~section.~~ appendix. Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this ~~section~~ appendix and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections ~~C408.2.4 and C408.2.5~~ AC101.2.4 and AC101.2.5

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

~~C408.2.1~~ AC 101.2.1 Commissioning plan. A *commissioning plan* shall be developed by a *registered design professional* or approved *agency* and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested, including, but not limited to calibrations and economizer controls.
4. Conditions under which the test will be performed. At a minimum, testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

~~C408.2.2~~ AC 101.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

~~C408.2.2.1~~ AC 101.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the

International Mechanical Code. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less.

~~C408.2.2.2~~ **AC 101.2.2.2** **Hydronic systems balancing.** Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

Exceptions:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in no greater than five percent of the nameplate horsepower draw above that required if the impeller were trimmed.

~~C408.2.3~~ **AC 101.2.3** **Functional performance testing.** Functional performance testing specified in Sections ~~C408.2.3.1 through C408.2.3.3~~ AC101.2.3.1 through AC101.2.3.3 shall be conducted.

~~C408.2.3.1~~ **AC 101.2.3.1** **Equipment.** Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. All modes as described in the *sequence* of *operation*;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

Exception: Unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(3) that do not require supply air economizers.

~~C408.2.3.2~~ **AC101.2.3.2** **Controls.** HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

~~C408.2.3.3~~ **AC 101.2.3.3** **Economizers.** Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

~~C408.2.4~~ **AC 101.2.4** **Preliminary commissioning report.** A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this ~~section~~ appendix that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

~~C408.2.4.1~~ **AC 101.2.4.1** **Acceptance of report.** *Buildings*, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

~~C408.2.4.2~~ AC 101.2.4.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary

~~C408.2.5~~ AC 101.2.5 Documentation requirements. The *construction documents* shall specify that the *documents* described in this section be provided to the *building* owner within 90 days of the date of receipt of the *certificate of occupancy*.

~~C408.2.5.1~~ AC 101.2.5.1 Drawings. Construction documents shall include the location and performance data on each piece of equipment.

~~C408.2.5.2~~ AC 101.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A narrative of how each system is intended to operate, including recommended setpoints.

~~C408.2.5.3~~ AC 101.2.5.3 System balancing report. A written report describing the activities and measurements completed in accordance with Section ~~C408.2.2.~~ AC 101.2.2.

~~C408.2.5.4~~ AC 101.2.5.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner and shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

~~C408.3~~ AC 101.3 Lighting system functional testing. Controls for automatic lighting systems shall comply with Section ~~C408.3~~ AC101.3.

~~C408.3.1~~ AC 101.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

Reason: We are not opposed to commissioning, in fact we fully support the concept. What we are opposed to is including language into a code that is not enforceable, inconsistent, or is written in such a way that enforcement will place a burden on building owners when occupancy permits are held up based on incomplete commissioning reports. There are many examples of this contained within this code change.

(1) C408.2 – "**Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion according to the provisions of this section.**" First off, this language suggests that only a registered design professional is permitted to provide such evidence, even if a licensed, Class A contractor designed the project. Second,

(2) 503.2.9.1 - "**Copies of all documentation shall be given to the owner**." We do not agree with language included in the code that requires a code official to verify contractual issues between an owner and their agents, designers, or contractors.

(3) 503.2.9.1.2 – "**All HVAC systems shall be balanced in accordance with generally accepted engineering standards**." "Shall be" is positive, enforceable language, however "generally accepted" is so open ended that consistency between any two individuals will be virtually impossible.

(4) 503.2.9.2 – "**shall not be issued a final certificate of occupancy**". This section states that a certificate of occupancy shall not be issued without receiving a letter from the owner stating that they have received the Preliminary Commissioning Report. Why should the owner of a building be penalized in such a harsh manner for a procedure that can obviously be conducted after occupancy.

(5) 503.2.9.3 – "**shall require that within 90 days after the date of final certificate of occupancy**". This section requires the code official to go back to the building owner after issuing the certificate of occupancy and verify that the building owner was provided with drawings, manuals, system balancing report, and the final commissioning report. Wow! After the certificate of occupancy is issued, the International Energy Conservation Code is no longer applicable to the building or building owner. I truly do not understand how this is going to work. What gives the code official the authority to verify and comply with this code section? What recourse does a code official have if the documentation is not provided to the building owner? Is the certificate of occupancy voided and the building occupants forced to vacate? After the certificate of occupancy is issued, the IECC is no longer applicable. The applicable code after the certificate of occupancy is issued is the Property Maintenance Code.

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

C408-EC-GRACE.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Commissioning is an important part of the code and should not be moved to an optional appendix. Building owners want a level of confidence that the complex systems work, commissioning provides a methodology to assure the systems functionality.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Approval as Submitted.

Commenter's Reason: The committee's reason for disapproval for this proposed change was as follows:

"Commissioning is an important part of the code and should not be moved to an optional appendix. Building owners want a level of confidence that the complex systems work, commissioning provides a methodology to assure the systems functionality."

We agree in part with this statement. Commissioning is an important part of the design and construction process, however proper commissioning should be completed at a time after an owner takes possession of the structure. These requirements prevents this from happening (see 1 below), and encourages improper commissioning procedures.

We are not opposed to commissioning, in fact we fully support the concept. What we are opposed to is including language into a code that is not enforceable, inconsistent, or is written in such a way that enforcement will place a burden on building owners when occupancy permits are held up based on incomplete commissioning reports. There are many examples of this contained within this code change.

(1) C408.2 – "**Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion according to the provisions of this section.**" First off, this language suggests that only a registered design professional is permitted to provide such evidence, even if a licensed, Class A contractor designed the project. Second, this section requires commissioning to be completed prior to the owner taking possession of the structure, and moving in.

(2) 503.2.9.1 - "**Copies of all documentation shall be given to the owner**." We do not agree with language included in the code that requires a code official to verify contractual issues between an owner and their agents, designers, or contractors.

(3) 503.2.9.1.2 – "**All HVAC systems shall be balanced in accordance with generally accepted engineering standards**." "Shall be" is positive, enforceable language, however "generally accepted" is so open ended that consistency between any two individuals will be virtually impossible.

(4) 503.2.9.2 – "**shall not be issued a final certificate of occupancy**". This section states that a certificate of occupancy shall not be issued without receiving a letter from the owner stating that they have received the Preliminary Commissioning Report. Why should the owner of a building be penalized in such a harsh manner for a procedure that can obviously be conducted after occupancy.

(5) 503.2.9.3 – "**shall require that within 90 days after the date of final certificate of occupancy**". This section requires the code official to go back to the building owner after issuing the certificate of occupancy and verify that the building owner was provided with drawings, manuals, system balancing report, and the final commissioning report. Wow! After the certificate of occupancy is issued, the International Energy Conservation Code is no longer applicable to the building or building owner. I truly do not understand how this is going to work. What gives the code official the authority to verify and comply with this code section? What recourse does a code official have if the documentation is not provided to the building owner? Is the certificate of occupancy voided and the building occupants forced to vacate? After the certificate of occupancy is issued, the IECC is no longer applicable. The applicable code after the certificate of occupancy is issued is the Property Maintenance Code.

CE350-13

Final Action: AS AM AMPC____ D

CE355-13
C408.2.4.1

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2.4.1 Acceptance of report. *Buildings,* or portions thereof, shall not <u>be considered acceptable for a final inspection pursuant to Section C104.3</u> ~~pass the final mechanical inspection~~ until ~~such time as~~ the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report<u>.</u>

Reason: This proposal revises the commissioning provision so that buildings cannot be considered for a final inspection (e.g., do not pass the mechanical inspection) until the owner indicates in writing they have the required commissioning report. This clarifies the code through the reference section for final inspections and eliminates unneeded language "such time as".

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

C408.2.4.1-EC-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The process should not be delayed waiting for the formality of the submitted report.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment 1:

Ellen Eggerton, Fairfax County, representing Virginia Building Coe Officials Association; requests Approval as Submitted.

Commenter's Reason: The existing code language puts the mechanical contractor on the hook for items that could be the responsibility of an electrical contractor or the general contractor. The code change holds up the final inspection regardless of which contractor is holding up the work.

Public Comment 2:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: The current code is clear, but not complete. It essentially says that the mechanical inspection is not passed until the code official has the required letter of transmittal. Without a letter of transmittal confirming the commissioning has been completed, the mechanical inspection would not be passed. Without passing the mechanical inspection, it is presumed any final inspection could not proceed, and any resultant occupancy permit could not be issued. At the code development hearing, there was opposition to this change based on the opinion that the revision would tend to hold up the conduct of inspections and, as a result, would hold up the issuance of the final occupancy permit. In disapproving the code change, the committee indicated that the process should not be delayed waiting for the formality of a submitted report. DOE does not believe the code change has a negative impact regarding overall project approvals and in some cases could eliminate re-inspections and speed the issuance of an occupancy permit.

The current and proposed code text only provides for the submission of a letter of transmittal related to receipt of the commissioning report by the building owner. Currently, the code says the building does not pass final mechanical inspection until the letter is received (i.e., even if all the other items covered by the mechanical inspection pass, no passage occurs until the letter is received). Proposal CE355-13 requires the receipt of the letter before the final inspection occurs. This should not delay the process, because it ensures that when the final mechanical inspection is done, the commissioning has been completed per code; as a result, the building is more likely to pass the final mechanical inspection. So the proposal does not delay the approval process for the building owner and in some cases could accelerate the process.

The code change proposal, as covered in more detail below, will not hold up the issuance of an occupancy permit and actually could speed its issuance. Under the current code, if the letter is not sent, then the mechanical inspection is not passed and subsequent inspections and issuance of an occupancy permit cannot occur.

The commissioning provisions in the code apply to mechanical systems as well as electrical power and lighting systems. It would seem then the code should also add electrical inspection passage as a criterion, but that is not currently addressed in the code, nor proposed herein. That said, the key issue is final inspection, which unlike mechanical or electrical inspections, is an item specifically covered in the code. Instead of addressing the passage of the mechanical or electrical inspections, which in turn trigger a final inspection and issuance of a certificate of occupancy, based on the receipt of a letter, it seems more appropriate to address that as a condition for a final inspection. This ensures conformance to all the system commissioning requirements, and provides a singular point of reference in the process. Either way, there is a possible hold up on issuing the occupancy permit (i.e., under the current code or proposed code language) based on receipt of the letter from the owner.

The remaining issue then is if the AHJ wants to conduct the inspection before or after receipt of the letter. It would seem more reasonable, given the intent of commissioning, that an inspector would be more likely to find fewer issues in inspecting a commissioned versus an un-commissioned building. Also, a requirement that the letter be posted prior to the final inspection provides some incentive for the building owner to ensure the commissioning is completed. Since the intent of commissioning is to ensure the building electrical, lighting and mechanical systems are properly and working, it is more appropriate to ensure commissioning is conducted prior to final inspection as opposed to logging the receipt of a letter from the owner after all the inspections have been completed. In either case, the issuance of a certificate of occupancy rests on receipt of the letter, and the inspections have to be conducted. If the above reasons are not sufficient, this requirement provides some incentive for the building owner to focus on getting this done, allowing the inspector to actually see the result in the building, which benefits both the builder and the AHJ.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

CE355-13

Final Action: AS AM AMPC____ D

CE356-13
C408.2.5.2

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
6. Operation and maintenance manuals for each piece of lighting equipment. Required routine maintaince actions, cleaning and recommended relamping shall be clearly identified.
7. A schedule for inspecting and recalibrating all lighting controls.
8. A narrative of how each system is intended to operate, including recommended setpoints.

Reason: The current requirements for manuals seems specific to HVAC documentation. This proposal adds additional language for the documentation, maintenance, and inspection of lighting equipment and controls. These requirements are consistent with ANSI/ASHRAE/IES Standard 90.1

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

C408.2.5.2-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the proposal because the information on the lighting controls is just as important as those on the HVAC systems. The listing of manual items is simply information for the building owner, it requires no action. Some felt that some or all of this would be better placed in commentary. Some felt that details on each luminaire is excessive detail.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ron Nickson, National Multi Housing Council, requests Disapproval.

Commenter's Reason: As noted by the proponent this change will increase the cost of construction. However, the proposal did not include any cost information or provide any cost effective analysis to justify the increase. The approved change will have a significant cost impact in that it requires:

1. Information and data on each piece of lighting equipment. The opened ended requirement can be interpreted in many ways and could ultimately require information on every light bulb, ceiling and wall fixture, lighting control (switches, automatic switches, etc.), electrical wiring, electrical boxes, breaker boxes and other electrical equipment used in the circuit to the light fixture. Providing the information has no cost benefit and it does not provide and cost savings.
2. Operation and maintenance manuals for "each" piece of lighting equipment along with maintenance actions, cleaning and recommended relamping. This requirement is unnecessary and costly in that it would require operation and maintenance manuals for items such as fixtures, bulbs, switches, etc. that in all reality have no maintenance in that when they fail they need to be replaced. In addition the requirement requires a list of all estimated relamping requirements which is unnecessary for operation of the building lighting. The estimated life of a bulb has little to do with replacement in that bulbs provide and very definite clue that they are no longer working and thus need to be replace.

CE356-13
Final Action: AS AM AMPC____ D

CE357-13
C408.3.1

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. ~~The construction documents shall state the party who will conduct the required functional testing.~~ Where required by the code official, an approved ~~party~~ individual independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
   - 1.1. For projects with up to seven occupancy sensors, all occupancy sensors shall be tested
   - 1.2. For projects with more than seven the following shall be verified:
     - 1.2.1. Status indicator (as applicable) operates correctly
     - 1.2.2. The controlled lights turn off or down to the permitted level within the required time,
     - 1.2.3. For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space,
     - 1.2.4. For manual on sensors, the lights turn on only when manually activated
     - 1.2.5. The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel. ~~the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.~~

Reason: For consistency with ASHRAE/IES 90.1. These revisions add more specific requirements to the functional testing of lighting controls for the common controls required by the standard and adds some clarification to the description of entities allowed to perform the testing and verification.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

C408.3.1-EC-FERGUSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval in order to address needed revisions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. Where required by the code official, an approved individual independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
   - 1.1 For projects with up to seven occupancy sensors, all occupancy sensors shall be tested. <u>For projects with more than seven, at least one of each sensor type and the sensors in one of each distinct room or space type shall be tested</u>
   - 1.2 For <u>all sensors required to be tested by item 1.1,</u> ~~projects with more than seven~~ the following shall be verified:
     - 1.2.1 Status indicators operate correctly
     - 1.2.2 The controlled lights turn off or down to the permitted level within the required time,
     - 1.2.3 For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space,
     - 1.2.4 For manual on sensors, the lights turn on only when manually activated
     - 1.2.5 The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel.

Commenter's Reason: The original proposal was written was not laid out correctly. The intent is for the all of the tests to be performed when required. If a project has 7 or fewer sensors, then all sensors must be tested. If a project has more than 7 sensors, then one set of sensors needs to be tested for distinct room or space types.
If you have 7 hallways and 19 offices, you would only be required to test all of the sensors in one of the hallways and one of the offices.

The current layout proposes to fix that and clarifies when the verification needs to occur.

Public Comment 2:

Eric Makela, Birtt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Add to Section C202 General Definitions

<u>**REGISTERED DESIGN PROFESSIONAL.** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.</u>

Revise as follows:

~~**C408.3.1 Functional testing.** Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party~~ <u>individual</u> ~~independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.~~

C408.3.1 Functional testing. <u>Prior to passing final inspection, the *registered design professional* shall provide evidence that the lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions</u>~~.~~ <u>Functional testing shall comply with Section C408.3.1.1 to C408.3.1.2 for the applicable control type.</u>

<u>**C408.3.1.1 Occupancy sensors** Where *occupancy sensors* are provided, the following procedures shall be performed:</u>

1. Certify that the occupancy sensor has been located and aimed in accordance with manufacturer recommendations
2. For projects with seven or fewer *occupancy sensors* each sensor shall be tested.
3. For projects with more than seven *occupancy sensors*, testing shall be done for each unique combination of sensor type and space geometry. Where multiples of each unique combination of sensor type and space geometry are provided no fewer than the greater of one, or 10 percent of each combination, shall be tested unless the code official or design professional require a higher percentage to be tested. Where 30 percent or more of the tested controls fail, all remaining identical combinations shall be tested.

   For each occupancy sensor to be tested, verify the following:
   - 3.1 Where occupancy sensors include status indicators, verify correct operation.
   - 3.2 The controlled lights turn off or down to the permitted level within the required time.
   - 3.3 For auto-on *occupancy sensors*, the lights turn on to the permitted level when an occupant enters the space.
   - 3.4 For manual on sensors, the lights turn on only when manually activated.
   - 3.5 The lights are not incorrectly turned on by movement in adjacent areas or by HVAC operation.

C408.3.1.2 Automatic time switches. Where automatic time switches are provided, the following procedures shall be performed:

1. Confirm that the automatic time switch control is programmed with accurate weekday, weekend, and holiday schedules.
2. Provide documentation to the owner of automatic time switch programming including weekday, weekend, holiday schedules, and set-up and preference program settings.
3. Verify the correct time and date in the time switch.
4. Verify that any battery back-up is installed and energized.
5. Verify that the override time limit is set to no more than 2 hours.
6. Simulate occupied condition. Verify and document the following:
   - 6.1 All lights can be turned on and off by their respective area control switch.
   - 6.2 The switch only operates lighting in the enclosed space in which the switch is located.
7. Simulate unoccupied condition. Verify and document the following:
   - 7.1 All non-exempt lighting turns off.
   - 7.2. Manual override switch allows only the lights in the enclosed space where the override switch is located to turn on or remain on until the next scheduled shut off occurs.
8. Additional testing as specified by the registered design professional.

C408.3.1.3 Daylight Controls Where daylighting controls are provided, the following procedures shall be performed:

1. All control devices have been properly located, field-calibrated and set for accurate set points and threshold light levels.
2. Daylight controlled lighting loads adjust to light level set points in response to available daylight.
3. The locations of calibration adjustment equipments are readily accessible only to authorized personnel.

C408.3.2 Documentation Requirements. The *construction documents* shall specify that *documents* certifying that the installed lighting controls meet documented performance criteria of Section C405 be provided to the *building* owner within 90 days from the date of receipt of the *certificate of occupancy*.

~~Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:~~

1. ~~Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.~~

   ~~1.1. For projects with up to seven occupancy sensors, all occupancy sensors shall be tested~~
   ~~1.2. For projects with more than seven the following shall be verified:~~
   - ~~1.2.1. Status indicator (as applicable) operates correctly~~
   - ~~1.2.2. The controlled lights turn off or down to the permitted level within the required time,~~
   - ~~1.2.3. For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space,~~
   - ~~1.2.4. For manual on sensors, the lights turn on only when manually activated~~
   - ~~1.2.5. The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation~~

2. ~~Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.~~

3. ~~Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel. the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.~~

Commenter's Reason: This Public Comment provides specific functional testing requirements for the specific types of lighting controls that are addressed in Section C405 of the IECC. The current language in Section C408.3 is not specific to lighting control type, providing general requirements with the intent that a system can be adequately "commissioned" if the section is followed. The Public Comment provides specific, step-by-step instructions testing occupancy sensors, daylighting controls and automatic time switches to ensure that they are operating correctly before system acceptance. The requirements will appear in the Southern

Nevada Energy Code and were proposed by the lighting design industry. The functional testing requirements are consistent with the timing and format of Section C408.2. Also the modification requires that the Registered Design Professional perform to testing requirement to be consistent with the Section C408 Commissioning requirements.

CE357-13

Final Action: AS AM AMPC____ D

CE361-13
C202 (New), C410 (New)

Proposed Change as Submitted

Proponent: Duane Jonlin, City of Seattle, representing City of Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Add new text as follows:

C410.1 General. A *solar zone* shall be provided for buildings which are five stories or less in height above grade plane, and shall be located on the roof of the building or elsewhere on the site. The *solar zone* shall comply with Sections C410.2 through C410.8 and *the International Fire Code*.

Exceptions:

1. A solar zone is not required where the solar exposure of the building's roof area is less than 75 percent of that of an unobstructed area in the same location, as measured by one of the following:

   1.1. Incident solar radiation expressed in kWh/ft²-yr using typical meteorological year (TMY) data
   1.2. Annual sunlight exposure expressed in cumulative hours per year using TMY data
   1.3. Shadow studies indicating that the area is more than 25 percent in shadow, on September 21 at 10am, 11am, 12pm, 1pm, and 2pm solar

2. Subject to the approval of the code official, buildings with extensive rooftop equipment that would make full compliance with this section impractical shall be permitted to provide a smaller *solar zone* than that required by Section C410.3.

C410.2 Minimum area. The minimum area of the *solar zone* shall be determined in accordance with Section C410.2.1 or C410.2.2, whichever results in the smaller area.

C410.2.1 Percentage of roof area. An area equal to 40 percent of the roof area calculated as the horizontally-projected gross roof area less the area covered by skylights, occupied roof decks and planted areas.

C410.2.2 Percentage of electrical service size. The electrical service size shall be the rated capacity of the total of all electrical services to the building, and the required *solar zone* size shall be based upon 10 peak watts of PV per square foot for 20 percent of the size of the electrical service.

C410.3 Obstructions. The *solar zone* shall be free of pipes, vents, ducts, HVAC equipment, skylights and other obstructions, except those serving PV or SWH systems within the solar zone. PV and SHW systems are permitted to be installed within the solar zone.

C410.4 Shading. Any existing or new object on the building or site that is located south, east, or west of the *solar zone* shall be set back from the *solar zone* a distance at least two times its height above the roof surface. Such objects include but are not limited to taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings. The *solar zone* shall not be located on a roof slope greater than 2:12 that faces within 45° of true north.

C410.5 Non-contiguous area. The *solar zone* is permitted to be comprised of smaller separated sub-zones. Each subzone shall be at least 5 feet wide in the narrowest dimension.

C410.6 Access. Areas contiguous to the *solar zone* shall provide access pathways and provisions for emergency smoke ventilation as required by the *International Fire Code.*

C410.7 Structural integrity. Where the *solar zone* is on the roof of the building or another structure on the site, the as-designed dead load and live load for the *solar zone* shall be clearly marked on the construction documents, and shall accommodate future PV or SHW arrays at an assumed dead load of 5 pounds per square foot in addition to other required live and dead loads. For PV systems, a location for inverters shall be designated either within or adjacent to the solar zone, with a minimum area of 2 square feet for each 1000 square feet of solar zone area, and shall accommodate an assumed dead load of 175 pounds per square foot.

C410.8 PV or SWH interconnection provisions. Buildings shall provide for the future interconnection of either a PV system in accordance with Section C410.2.8.1 or an SWH system in accordance with Section C410.2.8.2.

C410.2.8.1 PV interconnection. A capped roof penetration sleeve shall be provided in the vicinity of the future inverter, sized to accommodate the future PV system conduit. Interconnection of the future PV system shall be provided for at the main service panel, either ahead of the service disconnecting means or at the end of the bus opposite the service disconnecting means, in one of the following forms:

1. A space for the mounting of a future overcurrent device, sized to accommodate the largest standard rated overcurrent device that is less than 20 percent of the bus rating; or
2. Lugs sized to accommodate conductors with an ampacity of at least 20 percent of the bus rating, to enable the mounting of an external overcurrent device for interconnection.

The electrical construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future inverters and metering equipment; and
3. Route for future wiring between the PV panels and the inverter, and between the inverter and the main service panel.

C410.2.8.2 SWH interconnection. Two capped pipe tees shall be provided upstream of the domestic water heating equipment to provide plumbing interconnections between a future SWH system and the domestic water heating system. Two roof penetration sleeves shall be provided in the vicinity of the solar zone, capable of accommodating supply and return piping for a future SWH system.

The plumbing construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future hot water storage tanks; and
3. Route for future piping between the solar zone and the plumbing interconnection point, following the shortest feasible pathway.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

SOLAR ZONE. A clear area or areas reserved solely for current and future installation of photovoltaic or solar hot water systems.

Reason: The cost of photovoltaic and solar water heating systems has declined markedly in recent years, but at this point they are still only marginally cost-effective. However, their cost continues to decline, and this rule will prepare our new building stock to easily install such systems at an appropriate time. As energy costs rise and solar generation costs decline, a point will be reached where large solar energy systems are a viable investment. This rule brings that date closer in time by clearing away any physical impediments to future installation.

The rule requires an unobstructed "solar zone" for most non-residential buildings of five stories or less, either 40 percent of the building's roof area, or an area large enough to generate 20% of the building's electricity.

Example: A building with a 10,000 SF total roof area, 1,000 SF skylight area, and a 400 Amp, 240 volt single phase electrical service is required to provide a solar zone area of the smaller of the following:

1. [40% x (10,000 SF roof area – 1,000 SF skylights)] = 3,600 SF, or
2. [400 Amp x 240 Volts x 20% / 10 watts per SF] = 1,920 SF

Therefore, a solar zone of 1,920 square feet is required

The solar zone requires a dedicated pathway for future connection to the electrical or water heating system, and may also be located above carports, canopies, or elsewhere on the building or site. Exemptions are provided for roofs that are extensively shaded or congested with equipment.

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

C410 (NEW)-EC-JONLIN.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt that the code should allow this as an owner option and not a requirement. They felt that the 'reserved area' concept is not workable over time. Residential use buildings should be exempted. Even if it is in an appendix, it needed to be acceptable code language.

Assembly Action: Approved as Modified

The modification included in the Assembly Action is to change the proposal to be located in an Appendix chapter in the Commercial IECC without any change to the text of the proposal.

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified and a Public Comment was received.

Public Comment:

Duane Jonlin, City of Seattle, Department of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

APPENDIX A

SOLAR ZONES

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION AC101
GENERAL

~~C410.1~~ AC101.1 General. A *solar zone* shall be provided for buildings which are five stories or less in height above grade plane, and shall be located on the roof of the building or elsewhere on the site. The *solar zone* shall comply with Sections ~~C410.2~~ AC102 through ~~C410.8~~ AC108 and *the International Fire Code*.

Exceptions:

1. A solar zone is not required where the solar exposure of the building's roof area is less than 75 percent of that of an unobstructed area in the same location, as measured by one of the following:
   1.1. Incident solar radiation expressed in kWh/ft²-yr using typical meteorological year (TMY) data
   1.2. Annual sunlight exposure expressed in cumulative hours per year using TMY data

1.3. Shadow studies indicating that the area is more than 25 percent in shadow on September 21 at 10am, 11am, 12pm, 1pm, and 2pm solar

2. Subject to the approval of the code official, buildings with extensive rooftop equipment that would make full compliance with this section impractical shall be permitted to provide a smaller *solar zone* than that required by Section ~~C410.3.~~ AC102.

SECTION AC102
AREA

~~C410.2~~ AC102.1 Minimum area. The minimum area of the *solar zone* shall be determined in accordance with Section AC102.1.1 ~~C410.2.1 or C410.2.2~~ or AC102.1.2, whichever results in the smaller area.

~~C410.2.1~~ AC 102.1.1 Percentage of roof area. An area equal to 40 percent of the roof area calculated as the horizontally-projected gross roof area less the area covered by skylights, occupied roof decks and planted areas.

~~C410.2.2~~ AC102.1.2 Percentage of electrical service size. The electrical service size shall be the rated capacity of the total of all electrical services to the building, and the required *solar zone* size shall be based upon 10 peak watts of ~~PV~~ photovoltaic system per square foot for 20 percent of the size of the electrical service.

SECTION AC103
OBSTRUCTIONS

~~C410.3~~ AC103.1 Obstructions. The *solar zone* shall be free of pipes, vents, ducts, HVAC equipment, skylights and other obstructions, except those serving ~~PV or SWH~~ photovoltaic (PV) or solar hot water (SWH) systems within the solar zone. PV and SHW systems are permitted to be installed within the solar zone.

SECTION AC104
SHADING

~~C410.4~~ AC104.1 Shading. Any existing or new object on the building or site that is located south, east, or west of the solar zone shall be set back from the solar zone a distance at least two times its height above the roof surface. Such objects include but are not limited to taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings. The *solar zone* shall not be located on a roof slope greater than 2:12 that faces within 45° of true north.

SECTION AC105
NON-CONTIGUOUS AREA

~~C410.5~~ AC105.1 Non-contiguous area. The *solar zone* is permitted to be comprised of smaller separated sub-zones. Each subzone shall be at least 5 feet wide in the narrowest dimension.

SECTION AC106
ACCESS

~~C410.6~~ AC106.1 Access. Areas contiguous to the *solar zone* shall provide access pathways and provisions for emergency smoke ventilation as required by the *International Fire Code.*

SECTION AC107
STRUCTURAL INTEGRITY

~~C410.7~~ AC107.1 Structural integrity. Where the *solar zone* is on the roof of the building or another structure on the site, the as-designed dead load and live load for the *solar zone* shall be clearly marked on the construction documents, and shall accommodate future PV or SHW arrays at an assumed dead load of 5 pounds per square foot in addition to other required live and dead loads. For PV systems, a location for inverters shall be designated either within or adjacent to the solar zone, with a minimum area of 2 square feet for each 1000 square feet of solar zone area, and shall accommodate an assumed dead load of 175 pounds per square foot.

SECTION AC108
INTERCONNECTIONS

~~C410.8~~ AC108.1 PV or SWH interconnection provisions. Buildings shall provide for the future interconnection of either a PV system in accordance with Section ~~C410.2.8.1~~ AC108.1.1 or an SWH system in accordance with Section ~~C410.2.8.2.~~AC108.1.2

~~C410.1~~ AC108.1.1 PV interconnection. A capped roof penetration sleeve shall be provided in the vicinity of the future inverter, sized to accommodate the future PV system conduit. Interconnection of the future PV system shall be provided for at the main service panel, either ahead of the service disconnecting means or at the end of the bus opposite the service disconnecting means, in one of the following forms:

1. A space for the mounting of a future overcurrent device, sized to accommodate the largest standard rated overcurrent device that is less than 20 percent of the bus rating; or
2. Lugs sized to accommodate conductors with an ampacity of at least 20 percent of the bus rating, to enable the mounting of an external overcurrent device for interconnection.

The electrical construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future inverters and metering equipment; and
3. Route for future wiring between the PV panels and the inverter, and between the inverter and the main service panel.

~~C410.8.2~~ AC108.1.2 SWH interconnection. Two capped pipe tees shall be provided upstream of the domestic water heating equipment to provide plumbing interconnections between a future SWH system and the domestic water heating system. Two roof penetration sleeves shall be provided in the vicinity of the solar zone, capable of accommodating supply and return piping for a future SWH system.

The plumbing construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future hot water storage tanks; and
3. Route for future piping between the solar zone and the plumbing interconnection point, following the shortest feasible pathway.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This proposal, as approved by Assembly Action in the Dallas meetings, places the "solar-ready" requirements in an Appendix, so that individual jurisdictions can choose to incorporate it or not, depending on local conditions. This will provide uniformity among those jurisdictions.

Note that this proposal does not place any restrictions on how the "solar zone" is used in the future. Also note that the solar zone size is reduced where skylights, roof plantings or occupied decks utilize portions of the roof.

CE361-13

Final Action: AS AM AMPC____ D

RE7-13
R302.1 (IRC N1101.11)

Proposed Change as Submitted

Proponent: Jerry Anderson, City of Overland Park, KS, representing self (anderson@opkansas.org)

Revise as follows:

R302.1 (N1101.11) Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be in accordance with ACCA Manual J. ~~a maximum of 72^{0}F (22^{0}C) for heating and minimum of 75^{0}F (24^{0}C) for cooling.~~

Reason: The purpose of this code change is to allow some flexibility in design conditions. There is no valid reason for the code to specify exact temperatures for interior design. Interior design conditions are all about comfort. The 72 degree temperature for heating and the 75 degree temperature for cooling are simply design temps where most people are comfortable, but comfort is dependent on physical attributes of individuals (age, sex, weight, metabolism, etc). If someone wishes to design a home or residential facility with different design conditions they should be allowed to do so. For example a group home being constructed for the elderly in accordance with the IRC provisions may wish to have different interior design temperatures for heating. The standard would allow for different design temperatures because it views the 72 degree and 75 degree marks as target values.

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

R302.1-EC-ANDERSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: ACCA Manual J gives a range of design conditions which are too broad a range to standardize the loads.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gerald Anderson, City of Overland Park, representing self, requests Approval as Submitted.

Commenter's Reason: The purpose of this code change is to allow some flexibility in design conditions. There is no valid reason for the code to specify exact temperatures for interior design. Interior design conditions are all about comfort. The 72 degree temperature for heating and the 75 degree temperature for cooling are simply design temps where most people are comfortable, but comfort is dependent on physical attributes of individuals (age, sex, weight, metabolism, etc.). If someone wishes to design a home for residential facility with different design conditions they should be allowed to do so. For example a group home being constructed for elderly in accordance with the IRC provisions may wish to have different interior design temperatures for heating. The standard would allow for different design temperatures because it views the 72 degree and 75 degree marks as target values.

RE7-13
Final Action: AS AM AMPC____ D

RE8-13
R202 (NEW) (IRC N1101.9 (NEW)), R304 (NEW) (IRC N1102.16 (NEW))

Proposed Change as Submitted

Proponent: Chris Mathis, Mathis Consulting Company, representing self

Add new text as follows:

R304 (N1102.16) SOLAR READY ZONE.

R304.1 (N1102.16.1) General. All new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall comply with sections R304.2 through R304.8.

R304.2 (N1102.16.2) Mandatory construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall indicate the *solar ready zone*.

R304.3 (N1102.16.3) Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of mandatory access or set back areas required by the *International Fire Code*. New detached one- and two-family dwellings, and multiple single family dwellings with three stories or more and with a total floor area less than or equal to 2000 square feet shall have a *solar ready zone* area no less than 150 square feet. The *solar ready zone* shall be comprised of areas that have no dimension less than five feet and are no less than 80 square feet exclusive of mandatory access or set back areas as required by the *International Fire Code*.

Exceptions:

1. New buildings with a permanently installed on-site renewable energy system.
2. Roof areas in shade more than 70 percent of the time.

R304.4 (N1102.16.4) Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

R304.5 (N1102.16.5) Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

R304.6 (N1102.16.6) Interconnection pathway. Construction documents shall indicate the installed pathways for conduit, pre-wiring, pre-plumbing, or plumbing chase from the *solar ready zone* to the electrical service panel or service hot water system.

R304.7 (N1102.16.7) Electrical service reserved space. The main electrical service panel shall have a minimum busbar rating of 200 amps, shall have reserved space to allow installation of a dual pole circuit breaker for future solar electric installation, and shall be labeled “For Future Solar Electric”. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

Exception: Building projects with installed pre-plumbing or plumbing chase from the *solar ready zone* to reserved space at the water heating system.

R304.8 (N1102.16.8) Construction documentation. A copy of the construction documents indicating the *solar ready zone* and other requirements of this section shall be posted near the electrical panel, water heater, or other conspicuous location in the building.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar electric or solar thermal system.

Reason: This proposal is intended to support future potential improvements for detached one- and two-family dwellings, and multiple single family dwellings for solar electric and solar thermal systems. The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

This proposal requires the installation of chase, conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. When considered at the time of design, this proposal needs not increase the cost of construction, though will add a small, recoverable cost in many cases.

The documentation of solar ready zones and roof load calculations (already performed during the design phase) will assist building departments, as well as any future solar contractors seeking to install renewable energy systems on the roof. The builder/designer is knowledgeable on the intricacies of each model and plan, and easily can identify unobstructed roof areas, as well as spaces where conduit, wiring, and plumbing can be routed from the roof to the respective utility areas. This will save building departments and solar designers time and effort when installing future solar systems.

Upfront costs of renewable energy systems frequently are the largest deterrent to installation. Without preparation at the time of construction, solar installation may not even be technically possible. If a homeowner wishes to install a solar energy system later, this preparation can save thousands of dollars in labor, installation, design, and integration of the solar system into the house. Solar ready design can decrease the payback period tremendously. This is critical as these systems continue to become more cost effective and incentives are more readily available. In the instance that the initial homeowner does not intend to install a solar system, making the building solar ready increases the resale value of the home and the cost can be recovered.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installation. Having important information and documentation available to the building department, solar contractor, and homeowner will assist in supporting the accelerated working environment many municipalities have mandated.

The U.S. Department of Energy's (DOE) SunShot Initiative has set a goal to make solar energy cost competitive with other forms of energy by the end of the decade which will reduce installed costs of solar energy systems by about 75%. This initiative, combined with increased pressures on our energy supply and demand, will encourage and drive greater adoption of renewable energy systems on residential buildings.

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

R304 (NEW)-EC-MATHIS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal does not contain enough information to decide that this is appropriate for all climate zones and for all the conditions that have been defined. This might be more appropriate as an appendix for jurisdictions to decide if this is appropriate for their community. In addition, the proposal is written in an overly complicated manner. This can be simpler.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ellen Eggerton, Fairfax County, VA, requests approval As Modified by this Public Comment.

Modify the proposal as follows:

R304 (N1102.16) SOLAR READY ZONE.

R304.1 (N1102.16.1) General. All new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall comply with sections R304.2 through ~~R304.8~~. R304.6

R304.2 (N1102.16.2) Mandatory construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall indicate the *solar ready zone*.

~~**R304.3 (N1102.16.3) Solar ready zone area**. The total *solar ready zone* area shall be no less than 300 square feet exclusive of mandatory access or set back areas required by the *International Fire Code*. New detached one- and two-family dwellings, and multiple single family dwellings with three stories or more and with a total floor area less than or equal to 2000 square feet shall have a *solar ready zone* area no less than 150 square feet. The *solar ready zone* shall be comprised of areas that have no dimension less than five feet and are no less than 80 square feet exclusive of mandatory access or set back areas as required by the *International Fire Code*.~~

~~**Exceptions:**~~

1. ~~New buildings with a permanently installed on-site renewable energy system.~~
2. ~~Roof areas in shade more than 70 percent of the time.~~

~~**R304.4 (N1102.16.4)**~~ **R304.3 (N1102.16.3) Obstructions**. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

~~**R304.5 (N1102.16.5)**~~ **R304.4 (N1102.16.4) Roof load documentation**. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

~~**R304.6 (N1102.16.6)**~~ **R304.5 (N1102.16.5) Interconnection pathway**. Construction documents shall indicate the installed pathways for conduit, pre-wiring, pre-plumbing, or plumbing chase from the *solar ready zone* to the electrical service panel or service hot water system.

~~**R304.7 (N1102.16.7) Electrical service reserved space**. The main electrical service panel shall have a minimum busbar rating of 200 amps, shall have reserved space to allow installation of a dual pole circuit breaker for future solar electric installation, and shall be labeled "For Future Solar Electric". The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.~~

~~**Exception:** Building projects with installed pre-plumbing or plumbing chase from the *solar ready zone* to reserved space at the water heating system.~~

~~**R304.8 (N1102.16.8)**~~ **R304.6 (N1102.16.6) Construction documentation**. A copy of the construction documents indicating the *solar ready zone* and other requirements of this section shall be posted near the electrical panel, water heater, or other conspicuous location in the building.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and ~~reserved~~ designated on the plans for the future installation of a solar electric or solar thermal system.

Commenter's Reason: This simplifies that the only requirement is to show the area of the roof that is within the 110 and 270 degrees of true north shown on the design drawings. All other issues are left to the homeowner to decide.

RE8-13

Final Action: AS AM AMPC____ D

RE9-13
R202 (NEW) (IRC N1101.9 (NEW)), R304 (NEW) (IRC N1101.16 (NEW))

Proposed Change as Submitted

Proponent: Jim Meyers, Southwest Energy Efficiency Project, representing Southwest Energy Efficiency Project

Add new text as follows:

SECTION R304
SOLAR READY ZONE

R304.1 General. (N1102.16.1) New detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall comply with Sections R304.2 through R304.8.

R304.2 (N1102.16.2) Construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall indicate a *solar ready zone*.

R304.3 (N1102.16.3) Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of access or set back areas as required by the *International Fire Code*. New multiple single family dwellings three stories or more in height above grade plane and with a total floor area less than or equal to 2000 square feet shall have a *solar ready zone* area of not less than 150 square feet. The *solar ready zone* shall be comprised of areas not less than five feet in width and not less than 80 square feet exclusive of access or set back areas as required by the *International Fire Code*.

Exceptions:

1. New buildings with a permanently installed on-site renewable energy system.
2. Roof areas that are in shade more than 70 percent of the time.

R304.4 (N1102.16.4) Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

R304.5 (N1102.16.5) Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

R304.6 (N1102.16.6) Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the *solar ready zone* to the electrical service panel or service hot water system.

R304.7 (N1102.16.7) Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric”. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

R304.8 (N1102.16.8) Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar electric or solar thermal system.

Reason: This proposal is intended to support future potential improvements for detached one- and two-family dwellings, and multiple single family dwellings for solar electric and solar thermal systems. The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready zone information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

This proposal does not require the installation of conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. It does not require the redesign of plans.

The documentation of solar ready zones and roof load calculations (already performed during the design phase) will assist building departments as well as any future solar contractors seeking to install renewable energy systems on the roof. The builder/designer is knowledgeable on the intricacies of each model and plan and can easily identify unobstructed roof areas as well as spaces where conduit, wiring and plumbing can be routed from the roof to the respective utility areas. This will save building departments and solar designers' time and effort when installing future solar systems. If a homeowner wishes to install a solar energy system later, this documentation can save thousands of dollars in labor, installation, design and integration of the solar system into the house.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installation. Having important information and documentation available to the building department, solar contractor and homeowner will assist in supporting the accelerated working environment many municipalities have mandated.

The U.S. Department of Energy's (DOE) SunShot Initiative has set a goal to make solar energy cost competitive with other forms of energy by the end of the decade which will reduce installed costs of solar energy systems by about 75%. This initiative, combined with increased pressures on our energy supply and demand, will encourage and drive greater adoption of renewable energy systems on residential buildings.

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

R304 (NEW)-EC-MEYERS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal does not contain enough information to decide that this is appropriate for all climate zones and for all the conditions that have been defined. This might be more appropriate as an appendix for jurisdictions to decide if this is appropriate for their community. In addition, the proposal is written in an overly complicated manner. This can be simpler.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jim Meyers, Southwest Energy Efficiency Project (SWEEP), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

APPENDIX A

SOLAR READY PROVISIONS – DETACHED ONE-AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE FAMILY DWELLINGS (TOWNHOUSES)

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AA101
SCOPE

AA101.1 General. This appendix contains requirements for new construction in jurisdictions where solar ready provisions are required.

Inclusion of this appendix by jurisdictions shall be determined through the use of locally available information.

SECTION AA102
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar electric or solar thermal system.

~~R304~~ AA103
SOLAR READY ZONE

~~R304.1~~ AA103.1 General. New detached one- and two-family dwellings, and multiple single family dwellings (townhouses) having roofs oriented between 110 degrees and 270 degrees of true north shall comply with sections ~~R304.2~~ AA103.2 through ~~R304.8~~ AA103.8.

Exceptions:

1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building without at least 600 square feet of solar ready zone that is unshaded for more than 70 percent of daylight hours annually.

~~R304.2~~ AA103.2 Construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings (townhouses) having roofs oriented between 110 degrees and 270 degrees of true north shall indicate the *solar ready zone*.

~~R304.3~~ AA103.3 Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of mandatory access or set back areas as required by the *International Fire Code*. New multiple single family dwellings (townhouses) three stories or ~~more~~ less in height above grade plane and with a total floor area less than or equal to 2000 square feet per dwelling shall have a *solar ready zone* area of not less than 150 square feet. The *solar ready zone* shall be comprised of areas not less than five feet in width and not less than 80 square feet exclusive of access or set back areas as required by the *International Fire Code*.

~~**Exception:**~~

1. ~~New residential buildings with a permanently installed on-site renewable energy system.~~
2. ~~Roof areas in shade more than 70 percent of the time.~~

~~R304.4~~ AA103.4 Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

~~R304.5~~ AA103.5 Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

~~R304.6~~ AA103.6 Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the *solar ready zone* to the electrical service panel or service hot water system.

~~R304.7~~ AA103.7 Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric”. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

~~R304.8~~ AA103.8 Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional

Commenter’s Reason: This public comment moves the proposed change with its floor modification, RE9, from the body of the IECC into a new appendix in the IECC. The original proposal was disapproved by the committee on a 5 to 6 vote and closely followed by a 33 to 35 vote with a floor action. Many committee members were supportive of the proposal but not as a mandatory code requirement. The original proposal was modified by a floor amendment to clarify and correct the code language; this language is included in this public comment. By moving these code requirements into an appendix it supports jurisdictions who do not want to adopt solar ready provisions today while also supporting jurisdictions who are considering adopting solar ready provisions.

A floor action at the Committee Action Hearings approved a commercial proposal on solar ready requirements (CE361) into a new appendix of the IECC. This public comment would align new provisions within the IECC for both commercial and residential buildings.

Public Comment 2:

Lorraine Ross, Intech Consulting Inc. representing The Dow Chemical Company requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

APPENDIX (X)

SOLAR READY PROVISIONS – DETACHED ONE-AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE FAMILY DWELLINGS (TOWNHOUSES)

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION XA101 SCOPE

XA101.1 General. These provisions shall be applicable for new construction where solar ready provisions are required.

SECTION XA102
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

XA103
SOLAR READY ZONE

XA103.1 General. New detached one- and two-family dwellings, and multiple single family dwellings (townhouses) with at least 600 square feet of roof area oriented between 110 degrees and 270 degrees of true north shall comply with sections XA103.2 through XA103.8.

Exceptions:

1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building with a solar ready zone that is shaded for more than 70 percent of daylight hours annually.

XA103.2 Construction document requirements for solar ready zone. Construction documents shall indicate the *solar ready zone*.

XA103.3 Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of mandatory access or set back areas as required by the *International Fire Code*. New multiple single family dwellings (townhouses) three stories or less in height above grade plane and with a total floor area less than or equal to 2000 square feet per dwelling shall have a *solar ready zone* area of not less than 150 square feet. The *solar ready zone* shall be comprised of areas not less than five feet in width and not less than 80 square feet exclusive of access or set back areas as required by the *International Fire Code*.

XA103.4 Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

XA103.5 Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

XA103.6 Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the *solar ready zone* to the electrical service panel or service hot water system.

XA103.7 Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric”. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

XA103.8 Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Commenter's Reason: The original proposal (RE9-13) was narrowly disapproved by the committee on a 5 to 6 vote and was closely followed by a 33 to 35 vote with a floor action. This public comment reflects many of the comments from both the committee and a floor amendment offered by public testimony on RE9-13 and moves the proposed change from the body of the code into a new appendix in the IECC.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installations. Having important information and documentation available to the building department, solar contractor and homeowner will assist in supporting the accelerated working environment many municipalities have mandated. It also provides uniform guidance for those jurisdictions where solar ready ordinances are under consideration.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready zone information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code. This proposal does not require the installation of conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. It does not require the redesign of plans.

It is also important to note that a commercial solar ready proposal (CE361-13) was Approved as Modified by Assembly Action to establish an Appendix Chapter for Solar Ready provisions in the Commercial IECC:

"The modification included in the Assembly Action is to change the proposal to be located in an Appendix chapter in the Commercial IECC without any change to the text of the proposal".

RE9-13

Final Action: AS AM AMPC____ D

RE10-13

R401.2 (IRC N1101.15), R402.4.1.2 (IRC N1102.4.1.2), R402.5 1 (IRC N1102.5.1), R403.2.2 (IRC N1103.2.2), R406 (NEW) (IRC N1106 (NEW)

Proposed Change as Submitted

Proponent: W. Ronald Burton, PTW Advisors, LLC., representing Leading Builders of America

Revise as follows:

R401.2 (N1101.2) Compliance. Projects shall comply with one of the following:

1. Sections identified as “mandatory” and with either sections identified as “prescriptive” or the performance approach in Section R405.
2. Optional Performance Compliance in Section R406.

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

> **Exception:** The air leakage rate in buildings complying with the Optional Performance Compliance in Section R406 shall not exceed 7 ACH50.

R402.5 (N1102.5) Maximum fenestration U -factor and SHGC (Mandatory). The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Sections R402.1.4, ~~or~~ R405 or R406 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 or Section R406 in Climate Zones 1 through 3 shall be 0.50

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential

of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 ft^2 (9.29 m^2) of conditioned floor area.

Exceptions:

1. Duct tightness test is not required if the air handler and all ducts are located within conditioned space.
2. Buildings complying with the Optional Performance Compliance in Section R406 shall have an air leakage rate not exceeding 8 cfm (226.6 L/min) for ducts located outside of conditioned space.

SECTION R406 (N1106)
OPTIONAL PERFORMANCE COMPLIANCE

R406.1 (N1106.1)Scope. This section establishes criteria for compliance using an optional energy performance analysis. Such analysis shall include only heating, cooling, and service water heating energy ~~only~~.

R406.2 (N1106.2) Mandatory requirements. Compliance with Section R406 requires compliance with the mandatory provisions identified in Chapter 4 of this code. Supply and return ducts not completely inside the *building thermal envelope* shall be ~~insulated to a minimum of~~ provided with insulation having an R value of not less than R-6.

R406.3 (N1106.3) Performance-based compliance. For *residential buildings* complying with Section R406, compliance based on simulated energy performance requires that a proposed *residential building* (*proposed design)* be shown to have an annual energy cost that is less than or equal to 95% of the annual energy cost of a residence complying with sections of the residential provisions in Chapter 4 of this code identified as "mandatory" and configured as specified by the *standard reference design* in Table R406.4.2 (1) using the U-factor and SHGC-factors ~~the values~~ in *Table R406.4.2 (5)*. The proposed design values shall not be greater than the U-factors specified in Table R406.4.2 (4) or the SHGC value specified in Table R406.4.2 (3). Energy prices shall be taken from ~~a source~~ an approved source ~~by the code official~~, such as the Department of Energy, Energy Information Administration's State Energy Price and Expenditure Report. Time-of-use pricing in energy cost calculations shall be required where required by the Code Official.

> **Exception**: The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be alternatives to the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

R406.4 (N1106.4) Documentation. Documentation of the software used for the performance design and the parameters for the building shall be in accordance with Sections R406.4.1 through R406.4.3.

R406.4.1 (N1106.4.1) Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

R406.4.2 (N1106.4.2) Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R406.3. The compliance documentation shall include the following information:

1. Address or other identification of the residence;
2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table R406.4.2 (1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design*, and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

406.4.2.1(N1106.4.2.1) Multiple orientations. Where an otherwise identical building model is offered in multiple orientations, documentation that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations shall be acceptable for demonstration of compliance for any orientation.

R406.4.3 (N1106.4.3) Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design.*
2. A certification signed by the builder providing the building component characteristics of the proposed design as given in Table R406.4.2 (1).
3. Documentation of the actual values used in the software calculations for the *proposed design*.

R406.5 (N1106.5) Calculation procedure. Calculations of the performance design shall be in accordance with Sections R406.5.1 and R406.5.2.

R406.5.1 (N1106.5.1) General. The standard reference design and *proposed design* shall be configured and analyzed using identical methods and techniques.

R406.5.2 (N1106.5.2) *Residential building* specifications. The *standard reference design* and *proposed design* shall be configured as specified by Table R406.4.2 (1).

R406.5.3 (N1106.5.3) Energy cost analysis. The annual energy cost of the *proposed design* shall be analyzed and compared to a design complying with sections of the residential provisions in Chapter 4 of this code identified as “mandatory” and configured as specified by the *standard reference design* in Table R406.4.2 (1) using the U-factor and SHGC-factors in *Table R406.4.2 (5)*.

R406.6 (N1106.6) Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between a design complying with sections of the residential provisions in Chapter 4 of this code identified as “mandatory” and configured as specified by the *standard reference design* in Table R406.4.2 (1) using the U-factor and SHGC-factors in *Table R406.4.2 (5)* and the *proposed design* and shall include the following capabilities:

1. The calculation procedure shall not allow the user to directly modify the building component characteristics of the design complying with sections of the residential provisions in Chapter 4 of this code identified as “mandatory” and configured as specified in Table R406.4.2 (1) using the U-factor and SHGC-factors in *Table R406.4.2 (5)*.
2. Calculation of whole-building ,~~(~~as a single zone,~~)~~ sizing for the heating and cooling equipment in the *standard reference design* residence in accordance with Section

R403.6.

3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table R406.4.2 (1) determined by the analysis to provide compliance, along with their respective performance ratings (such as R-value, U-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

R406.6.2 (N1106.6.2) Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be approved. Approval of tools shall be based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

R406.6.3 (N1106.6.3) Input values. When calculations require input values not specified by Sections R403, R404 and R406, those input values shall be taken from an approved source.

TABLE R406.4.2 (1) (N1106.4.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame. Gross area: same as proposed U-factor: from Table R406.4.2 (4) Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed[a] As proposed As proposed
Basement and crawl space walls	Type: same as proposed Gross area: same as proposed U-factor: from Table R406.4.2 (4), with insulation layer on interior side of walls.	As proposed As proposed As proposed[a]
Above-grade floors	Type: wood frame Gross area: same as proposed U-factor: from Table R406.4.2 (4)	As proposed As proposed As proposed[a]
Ceilings	Type: wood frame Gross area: same as proposed U-factor: from Table R406.4.2 (4)	As proposed As proposed As proposed[a]
Roofs	Type: composition shingle on wood sheathing Gross area: same as proposed Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed
Attics	Type: vented with aperture = 1 ft^2 per 300 ft^2 ceiling area	As proposed
Foundations	Type: same as proposed foundation wall area above and below grade and soil characteristics.	As proposed
Doors	Area: 40 ft^2 Orientation: North U-factor: same as fenestration from Table R406.4.2 (4).	As proposed As proposed As proposed[a]
Glazing[b]	Total area[c] =15% of the conditioned floor area. Orientation: equally distributed to four cardinal compass orientations (N, E, S & W). U-factor: from Table R406.4.2 (4) SHGC: From Table R406.4.2 (3) except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: Summer (all hours when cooling is required) = 0.70 Winter (all hours when heating is required) = 0.85[e] External shading: none	As proposed As proposed As proposed[d] As proposed Same as *standard reference design* As proposed

BUILDING COMPONENT	**STANDARD REFERENCE DESIGN**	**PROPOSED DESIGN**
Skylights	None	As proposed
Thermally isolated sunrooms	None	As proposed
Air exchange rate	Air leakage rate of 7 air changes per hour at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than 0.01 x CFA + 7.5 x (N_{br} + 1) where: CFA = conditioned floor area N_{br} = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the *standard reference design*. For tested residences, the measured air exchange rate[f]. The mechanical ventilation rate[g] shall be in addition to the air leakage rate and shall be as proposed.
Mechanical ventilation	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: kWh/yr = 0.03942 x CFA + 29.565 x (N_{br} +1) where: CFA = conditioned floor area N_{br} = number of bedrooms	As proposed
Internal gains	IGain = 17,900 + 23.8 x CFA + 4104 x N_{br} (Btu/day per dwelling unit)	Same as *standard reference design*.
Internal mass	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as *standard reference design*, plus any additional mass specifically designed as a thermal storage element[h] but not integral to the building envelope or structure.
Structural mass	For concrete or masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air. For concrete or masonry basement walls, as proposed, but with insulation required by Table R406.4.2 (3) located on the interior side of the walls. For other walls, for ceilings, floors, and interior walls, wood frame construction.	As proposed As proposed As proposed
Heating systems[i, j]	Fuel type: same as proposed design Efficiencies: Electric: air-source heat pump with prevailing federal minimum standards. Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards. Nonelectric boilers: natural gas boiler with prevailing federal minimum standards. Capacity: sized in accordance with Section R403.6	As proposed As proposed[m]
Cooling systems[i, k]	Fuel type: Electric Efficiency: in accordance with prevailing federal minimum standards. Capacity: sized in accordance with Section R403.6.	As proposed
Service water heating[i, l]	Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum standards. Use: Use: gal/day = 30 + (10 N_{br}) Tank temperature: 120^{0}F	As proposed Same as *standard reference design.*
Thermal distribution systems	Duct outside the *building thermal envelope* shall be insulated to R-6 as required by Section R406.2. Untested distribution systems: DSE = 0.88	Thermal distribution system efficiency shall be as tested to outside

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
	Tested ducts: Leakage rate to outside conditioned space as specified in Section R403.2.2. Duct location: Unconditioned attic Duct insulation: Per Section R403.2.1	conditioned space or as specified in Table R406.4.2 (2) if not tested. As proposed As proposed
Thermostat	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	As proposed

For SI: 1 square foot = 0.93 m^2, 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m^2, 1 gallon (U.S.) = 3.785 L, °C = (°F-3)/1.8, 1 degree = 0.79 rad.

a. If the total building thermal envelope UA (sum of U- factor times assembly area) is less than or equal to the total UA from using the U-factors in Table R406.4.2 (4) (multiplied by the same assembly area as in the proposed building), the building shall be considered to be in compliance with Table R406.4.2 (3). The UA calculation shall be performed using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

b. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

c. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:
AF = As x FA x F
where:
AF = Total glazing area.
As = Standard reference design total glazing area.
FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).
F = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.
and where:
Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.
Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.
Below-grade boundary wall is any thermal boundary wall in contact with soil.
Common wall area is the area of walls shared with an adjoining dwelling unit.
L and CFA are in the same units.

d. The use of an area-weighted average of fenestration products satisfies the U–factor requirements. The use of an area-weighted average of fenestration products more than 50-percent glazed satisfies the SHGC requirements.

e. For fenestrations facing within 15 degrees (0.26 rad) of true south that are directly coupled to thermal storage mass, the winter interior shade fraction shall be permitted to be increased to 0.95 in the proposed design.

f. Where required by the code official, testing shall be conducted by an approved party. Hourly calculations as specified in the ASHRAE Handbook of Fundamentals, or the equivalent shall be used to determine the energy loads resulting from infiltration.

g. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals, and the "Whole-house Ventilation" provisions of 2001 ASHRAE Handbook of Fundamentals, for intermittent mechanical ventilation.

h. Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element ~~must~~ shall be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or ~~must~~ shall be connected to such a room with pipes or ducts that allow the element to be actively charged.

i. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

j. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

k. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

l. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

m. Energy savings resulting from specification of a natural gas furnace with minimum 90% AFUE in climate zones 4-8 shall not be utilized in calculating the annual energy cost of the *proposed design*.

TABLE R406.4.2 (2) (N1106.4.2(2))
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED DESIGNS[a]

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION	FORCED AIR SYSTEMS	HYDRONIC SYSTEMS[b]
Distribution system components located in unconditioned space		0.95
Untested distribution systems entirely located in conditioned space[c]	0.88	1
"Ductless" systems[d]	1	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093m2, 1 pound per square inch = 6895 Pa, 1 inch water gauge = 1250 Pa.

a. Default values given by this table are for untested distribution systems, which must still meet minimum requirements for duct system insulation.
b. Hydronic systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed-loop piping and that do not depend on ducted, forced airflow to maintain space temperatures.
c. Entire system in conditioned space shall mean that no component of the distribution system, including the air-handler unit, is located outside of the conditioned space.
d. Ductless systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air-handler enclosure.

TABLE R406.4.2(3) (N1106.4.2(3))
INSULATION AND FENESTRATION BASELINES BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[c]	FLOOR R-VALUE	BASEMENT[d] WALL R-VALUE	SLAB[e] R-VALUE & DEPTH	CRAWL SPACE[d] WALL R-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65[f]	0.75	0.30	30	13	4/6	13	0	0	0
3	0.50[f]	0.65	0.30	30	13	5/8	19	5/13[g]	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR[h]	38	20 or 13+5[i]	13/17	30[j]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5[i]	15/19	30[j]	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38[j]	15/19	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films.
b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. The use of an area-weighted average of fenestration products more than 50-percent glazed satisfies the SHGC requirements.
c. The second R-value applies where more than half the insulation is on the interior of the mass wall.
d. "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" is also met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
e. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.
f. For impact rated fenestration complying with Section R301.2.1.2 of the International Residential Code or Section 1609.1.2 of the International Building Code, the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.
g. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.
h. There are no SHGC requirements in the Marine Zone.
i. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.
j. Or insulation sufficient to fill the framing cavity, R-19 minimum.

TABLE R406.4.2(4) (N1106.4.2(4))
EQUIVALENT U-FACTORS[a,b, c]

CLIMATE ZONE	FENESTRATION U-FACTOR[d]	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR[e]	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.082	0.141	0.047	0.091[f]	0.136
4	0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065

except Marine								
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.028	0.050	0.065

a. An assembly with a U-factor equal to or less than that specified in Table R406.4.2 (4) shall be permitted as an alternative to the R-value in Table R406.4.2 (3).

b. If the total building thermal envelope UA (sum of U- factor times assembly area) is less than or equal to the total UA resulting from using the U- factors in Table R406.4.2 (4) (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R406.4.2 (3). The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

c. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

d. The use of an area-weighted average of fenestration products satisfies the U–factor requirements.

e. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall U-factor in Marine Zone 4 and Zones 5 through 8.

f. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

TABLE R406.4.2(5) (IRC N1106.4.2(5))
ENERGY COST COMPARISON U- AND SHGC-FACTORS[a]

CLIMATE ZONE	FENESTRATION U-FACTOR	GLAZED FENESTRATION SHGC[b]	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR[c]	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.25	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.25	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.25	0.55	0.030	0.057	0.098	0.047	0.091[d]	0.136
4 except Marine	0.35	0.40	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine	0.32	NR	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	NR	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	NR	0.55	0.026	0.048	0.057	0.028	0.050	0.055

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

b. The SHGC column applies to all glazed fenestration. Exception: Skylights are excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. Where more than half the insulation is on the interior, the mass wall U-factors shall be not greater than 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.

d. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

Reason: This proposal provides a new alternative performance compliance path in the residential section of the IECC that results in much more energy efficient homes by providing greater flexibility and compliance options for builders and design professionals.

Specifically, the proposal adds a new Section R406 – Optional Performance Compliance - and modifies specific sections of the IECC to facilitate the use of this new performance alternative. With these proposed changes in place, users would have the option to comply as currently required using either the prescriptive or performance approach (Section 405) or they can choose to comply with the Optional Performance Compliance in Section R406. Choosing to comply with Section R406 would however result in a home that has an annual energy cost that is less than or equal to 95% of the annual energy cost of a home built in compliance with the current code. Put simply, this alternative path is more stringent than the current IECC because it results in homes that are 5% more energy efficiency than one built in compliance with the current code.

In order to make new Section R406 as easy to understand and use as possible, this section mirrors the format of the current Section R405 performance alternative. That includes the requirement to comply with the current "mandatory" requirements in Chapter 4. Of critical importance however, greater flexibility over the current performance alternative in Section R405 is achieved with the inclusion of much more robust compliance options in the procedures for configuring and analyzing the standard reference design and the proposed design as outlined in Table R406.4.2 (1). These more robust compliance options include the reintroduction of the HVAC equipment trade-offs that were a part of the IECC until they were eliminated in the 2009 edition. Elimination of the ability to take advantage of more efficient heating and cooling equipment has been one of the biggest factors in the lack of support the 2009 and 2012 editions of the IECC have received in the marketplace not only by home builders but by code officials and elected officials as well. It makes little sense to require extremely stringent envelope and other requirements while at the same time greatly discouraging the use of more efficient HVAC equipment. Either we want builders and designers to choose more efficient options or we don't – and current IECC requirements send a clear message that we do not want to encourage the choice of more innovative and efficient heating and cooling systems. Section R406 compliance directly addresses this issue.

Additional compliance options in the new Optional Performance Compliance path include the ability to take advantage of designs with less glazing than the minimum percentage of glazing in the current performance alternative in Section R405. In addition, the calculation procedure in the new Section R406 includes the much more reasonable U-Factors and SHGC Factors from the 2009 IECC, while also requiring the annual energy cost of the proposed design to be 5% MORE efficient than a home built to the current IECC requirements. Again, the prescriptive path R- and U-Factor and SHGC tables in the current IECC are a major contributing factor in the lack of support, adoption and enforcement of the 2012 IECC. Those problems can be greatly alleviated by allowing builders and designers to have the maximum amount of flexibility in determining compliance with the code. That is especially true given that in exchange for the ability to design and build homes with proven market acceptance in more cost-effective ways, this proposal by a group of the largest U. S. home building companies who build over 80,000 homes in the U. S. each year would actually make the annual energy cost target even more stringent than currently required.

As previously discussed, the heart of this proposal is the new Optional Performance Compliance in Section R406. While large portions of Section R406 mirror the language in the current Section R405, specific sections deserve greater explanation.

- Section R406.2: this section mirrors the current R405.2 language, including the requirement that the "mandatory" provisions in Chapter 4 be met by designs complying with R406.
- Section R406.3: like the current Section R405.3, this section outlines the primary performance compliance concepts and includes the requirement for the annual energy cost of the proposed design to equal or be less than 95% of the annual energy cost of a home built to the current Chapter 4 requirements. This is accomplished by evaluating the annual energy cost of the proposed design versus compliance with the "mandatory" sections in Chapter 4 PLUS the U-Factors and SHGC Factors found in the 2012 IECC (Tables R402.1.1 and R402.1.3) which are contained in Table R406.4.2 (5). Section R406.3 also references Table R406.4.2 (1) outlining the configuration and analysis of the proposed design using prescriptive requirements in the 2009 code.
- Sections R406.4 Documentation, R406.5 Calculation procedure, and R406.6 Calculation software tools mirror the requirements in the current Section R405 performance alternative.
- Table R406.4.2 (1) contains the standard reference and proposed design parameters for all building component elements.
- Tables R406.4.2 (4) and R406.4.2 (3) contain the insulation and fenestration baseline factors from the 2009 IECC used in the calculation based on the parameters in Table R406.4.2 (1).

Table R406.4.2 (5) contains the energy cost comparison U-Factors and SHGC factors used in calculating the annual energy cost of a home built in compliance with the current Chapter 4 requirements.

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

R401.2-EC-BURTON.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee considered the higher allowable house leakage rate to be a lessening of stringency as this would allow looser duct connections.. The proposed change failed to place enough focus on

energy consumption. The code already has flexibility in the performance path of Section 405; therefore this is not necessary.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

W. Ronald Burton, PTW Advisors, LLC, representing Leading Builders of America requests Approval as Submitted.

Commenter's Reason: The recommendation by the Residential IECC Code Development Committee in a split vote for disapproval of code change proposal RE10-13 should be overturned and the proposal approved as submitted.

This proposal provides a new alternative performance compliance path in the residential section of the IECC that results in much more energy efficient homes by providing greater flexibility and compliance options for builders and design professionals. Designers and builders choosing this alternative performance compliance path would have the option to comply as currently required using either the prescriptive or performance approach (Section 405) or to comply with the Optional Performance Compliance in Section R406. Choosing to comply with Section R406 would however result in a home that has an annual energy cost that is less than or equal to 95% of the annual energy cost of a home built in compliance with the current code. Contrary to testimony offered by opponents of RE10-13 at the Code Development Hearings claiming that the use of this alternative performance compliance path would "roll back" the stringency of the IECC**, this alternative path is clearly more stringent than the current IECC because it results in homes that are 5% more energy efficient than one built in compliance with the current code.**

It is important to point out that while greater flexibility over the current performance alternative in Section R405 would be achieved with the inclusion of much more robust compliance options in the procedures for configuring and analyzing the standard reference design and the proposed design as outlined in Table R406.4.2 (1), compliance with the current "mandatory" requirements in Chapter 4 is required by this alternative path. The more robust compliance options include the reintroduction of the HVAC equipment trade-offs that were a part of the IECC until they were eliminated in the 2009 edition. Elimination of the ability to take advantage of more efficient heating and cooling equipment has been one of the biggest factors in the lack of support the 2009 and 2012 editions of the IECC have received in the marketplace not only by home builders but by code officials and elected officials as well. It is also important to note that the IECC Code Development Committee recommended approval as submitted for a separate proposal to reintroduce the HVAC equipment trade-offs in the residential section of the 2015 IECC. As pointed out in our initial reason statement, either we want builders and designers to choose more efficient options or we don't – and current IECC requirements send a clear message that we do not want to encourage the choice of more innovative and efficient heating and cooling systems.

Calculation procedures in the proposed Section R406 include requirements that establish minimum U-Factors and SHGC Factors for building thermal envelope elements from the 2009 IECC, while also requiring the annual energy cost of the proposed design to be 5% MORE efficient than a home built to the current IECC requirements. This is especially important given that this proposal is put forward by a group of the largest U. S. home building companies who build over 80,000 homes in the U. S. each year. We therefore respectfully urge the ICC voting members to overturn the Code Development Committee recommendation for disapproval and approved RE10-13 as submitted.

RE10-13

Final Action: AS AM AMPC____ D

RE11-13
R401.2 (IRC N1101.15)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, representing National Association of Home Builders (dsurrena@nahb.org)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with ~~Sections identified as "mandatory" and with either sections identified as "prescriptive" or the performance approach in Section R405.~~ one of the following:

1. Sections R401 through R404 or;
2. Section R405 and the provisions of Sections R401 through R404 labeled "Mandatory" or
3. *Approved* computer software, worksheets or compliance manuals that also meet the provisions of Sections R401 through R404 labeled "Mandatory" and the intent of this code or;
4. Buildings certified as complying with the energy efficiency requirements of an above code program in accordance with Section R102.1.1.

Reason: This amendment clarifies the section. It also provides for alternative options such as industry rating programs or other programs to be recognized as complying with the IECC.

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

R401.2-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposed change provides language that adds clarity to code logic.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shaunna Mozingo, City of Cherry Hills Village, CO representing self and, Hope Medina, City of Cherry Hills Village, CO, representing self, request As Modified by this Public Comment.

Modify the proposal as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with one of the following:

1. Sections R401 through R404 or;
2. Section R405 and the provisions of Sections R401 through R404 labeled "Mandatory" or
3. *Approved* computer software, worksheets or compliance manuals that ~~also~~ meet the provisions of this code including Sections R401 through R404 labeled "Mandatory" ~~and the intent of this code~~ or;
4. Buildings certified as complying with the energy efficiency requirements of an above code program in accordance with Section R102.1.1.

Commenter's Reason: The testimony in opposition at the committee hearings mainly focused on the fact that the proposal did not give clarity, introduced vagueness, and most of the items already existed. While we agree that as approved, the language was very confusing at best, we feel that the proposed modification brings clarification while continuing to offer additional methods to show compliance. The new wording in item number 3 is consistent with the documentation requirements for section 405 for the simulated performance alternative.

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

R401.2 (N1101.15) Compliance. Projects shall comply with one of the following:

1. Sections R401 through R404 or;
2. Section R405 and the provisions of Sections R401 through R404 labeled "Mandatory" or
3. ~~*Approved* computer software, worksheets or compliance manuals that also meet the provisions of Sections R401 through R404 labeled "Mandatory" and the intent of this code or;~~
~~4.~~ ~~Buildings certified as complying with the energy efficiency~~ The requirements of an above code program in accordance with Section R102.1.1.

Compliance shall be permitted to be demonstrated by *approved* computer software, worksheets or compliance manuals in accordance with Section R101.5.1.

Commenter's Reason: The proposed modifications clarify this proposal and clear up some inconsistencies in the language. Item 3 is moved to the end of the section because a permit application does not comply with software—the software is a method of showing compliance with the code. Section R101.5.1 addresses software as a compliance material not as something to be complied with. Item 4 is also clarified. As proposed, this section states that "Projects shall comply with one of the following" including "Buildings certified as complying with …" Projects don't comply with buildings, but they do comply with the above code programs.

Public Comment 3:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc. request Disapproval.

Commenter's Reason: We recommend disapproval of RE11. In RE11, NAHB proposes to weaken energy efficiency requirements of the code by adding two new unnecessary compliance options to Chapter 4 of the IECC, with insufficient protections to ensure energy efficiency equivalent to the current code. The revisions proposed in RE11 are internally inconsistent and create new compliance loopholes that could be used to avoid crucial energy efficiency requirements. While it is unclear how jurisdictions and code officials will apply the confusing language proposed in RE11, a plain reading of the new language reveals several problems:

- Alternative (1) removes the requirement that mandatory requirements be met in the prescriptive, UA, or Total UA alternative compliance options, and simply requires that projects comply with "Sections R401 through R404." As a result, it is unclear what is intended by the proponent regarding mandatory requirements.
- Alternative (3) creates a new compliance path in Chapter 4 that permits the use of software, worksheets, or compliance manuals that meet the mandatory requirements of sections R401-404, but makes no mention of also meeting the actual prescriptive or performance requirements, as long as the "intent" of the IECC is met. This results in a vague new Chapter 4 compliance path with no parameters to permit reasonable compliance and enforcement.
- Alternative (4) could be construed to take away the code official's discretion to deem whether to allow compliance via "above code programs" under Section R102.1.1, and mandates acceptance of buildings certified to "above code programs."

In short, alternatives (1) and (3) are incomplete methods for verifying code compliance. Alternative (4) is potentially a less effective method for compliance verification than the methods established by the current IECC. Section R102.1.1 of the IECC already empowers code officials or the authority having jurisdiction to deem specific programs to exceed the energy efficiency required by the IECC, as long as mandatory requirements are met; unless NAHB intends to modify the protections of section R102.1.1, there is no reason to reiterate this option. As a result, it appears that RE11 is intended to remove important limitations and the discretion of the authority having jurisdiction to determine whether to permit compliance through these programs at all.

The committee's reason for RE11 simply notes that the proposal "provides language that adds clarity to code logic." However, as outlined above, RE11 will only add confusion, potentially create compliance loopholes and enforcement problems and generally create new, unnecessary controversies without saving any energy. It should be disapproved.

Public Comment 4:

Stephen Turchen, Fairfax County, VA, representing Virginia Building and Code Officials Association requests Disapproval.

Commenter's Reason: Notwithstanding the proponent's original Reason statement, the code change proposal does not add clarity to R401.2 and may in fact cause additional confusion.

Option 3 states that *approved* compliance tools shall also meet mandatory provisions of the residential chapter. Is it practical or possible for a software program, for example, to capture all Mandatory provisions of the residential chapter of the IECC? The approved tool must have this capability regardless of whether it is implementing the "Prescriptive" provisions of Sections R401through R404 or the Section 405 Performance Alternative provisions.

Option 3 further states that the compliance tool must also meet the intent of this code. "Intent" is subjective and subject to interpretation; e.g., see Code Change Proposals RE129 and RE133 from this cycle. This phrase is unnecessary and will cause avoidable debate and confusion. The requirements of the code are embodied in the code text and must be met. If an alternative compliance method is desired, see Section R102.

Option 4 is redundant and unnecessary. Above-code programs are already covered under Section R102.1.1. What additional precision or clarity is gained from re-stating this provision in a modified Section R401.2? Such programs can already be recognized as code-compliant if *approved.*

The current Section R401.2 is sufficiently clear as currently written and has not been the subject of confusion among VBCOA's members in implementing the IECC.

RE11-13

Final Action: AS AM AMPC____ D

RE12-13
R401.2 (IRC N1101.15)

Proposed Change as Submitted

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as "mandatory" and with either of the following: ~~sections identified as "prescriptive" or the performance approach in Section R405.~~

1. Sections identified as "prescriptive."
2. Section R405.

Reason: The proposed change provides a clarification. The current wording in the code has led to some confusion as to whether the mandatory lighting provisions of Section R404 are required when a home complies via the performance path of Section R405.

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

R401.2-EC-WILLIAMS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This was disapproved in favor of RE11-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with ~~Sections identified as "mandatory" and with either of the following~~:

1. Sections R401 through R404 or ~~identified as "prescriptive."~~
2. Section R405 and the provisions of Sections R401 through R404 labeled "mandatory".

Commenter's Reason: The proposed change provides a clarification. The current wording in the code has led to some confusion as to whether the mandatory lighting provisions of Section R404 are required when a home complies via the performance path of Section R405.

This public comment addresses the reason for disapproval at the Committee Action Hearings by making the language of this proposal consistent with corresponding parts of approved proposal RE11 that clarify section R401.2. RE11 contains additional provisions that go beyond clarification and consequently may not prevail in Final Action.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

RE12-13

Final Action: AS AM AMPC____ D

RE13-13
R401.3 (IRC N1101.16)

Proposed Change as Submitted

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition (Brian.Dean@icfi.com)

Revise as follows:

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed and shall be posted ~~on or in the electrical distribution panel~~ by the builder or registered design professional at either an *approved accessible* location inside the *building* or electronically in an *accessible* certificate database maintained by an approved agency or the jurisdiction, with a permanent notification of the location of such record posted at an approved *accessible* location inside the building. A copy of the certificate shall also be filed in the land records. Where posted on the electrical distribution panel, t~~T~~he certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the ~~predominant~~ *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component category, the certificate shall list either all of the values with their associated areas or the area-weighted average value for that component category ~~covering the largest area~~. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency level shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

Reason: The purpose of this code change is to provide reasonable improvements to the certificate and alternatives to the current posting requirement that will meet the intent of the provision and improve the usability of the certificate. Specifically , the change will allow the certificate to be permanently posted at an accessible location other than the electrical panel, including the option of an electronic version that may be maintained off-site (with a permanent notice posted in the home). A copy of the certificate would also be required to be filed with the land record, where it can most easily be located in the future.

The proposal also clarifies that actual U-factors and R-values (or area-weighted averages) must be listed on the label. The current certificate requirement, which only includes listing the value for components "covering the largest area," does not give enough useful information to future owners or occupants of the home who may be replacing or retrofitting components in the home. The proposed additional information for the certificate should already be well known by the builder or design professional at the time of construction, since it is required for code compliance, so there should be no significant additional work or cost associated with adding these details.

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

R401.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: While this is a commendable attempt to provide flexibility for this certificate installation, it requires a structure for a database that would need to be established in local communities. This can only be implemented if such a structure already exists. In most communities this is still not feasible.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc. request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R401.3 Certificate (Mandatory). A permanent certificate shall be completed and shall be posted by the builder or registered design professional at ~~either~~ an *approved accessible* location inside the *building* or shall be recorded electronically in an *approved accessible* certificate database if one is maintained by an approved agency or the jurisdiction, with a permanent notification of the location of such electronic record posted at an approved *accessible* location inside the building. ~~A copy of the certificate shall also be filed in the land records.~~ Where posted on the electrical distribution panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component category, the certificate shall list either all of the values with their associated areas or the area-weighted average value for that component category. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency level shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

Commenter’s Reason: We recommend approval of RE13 as modified by this public comment. While RE14 and RE16 provide some additional flexibility and were recommended for approval, these proposals can be further improved by approval of RE13. RE13 as modified harmonizes the changes from RE14 and RE16 into one code change, while adding some additional important features:

- RE13 as modified gives a jurisdiction an option to maintain an electronic certificate database. This will modernize the code, while still preserving the hard copy certificate option for those jurisdictions that do not wish to create such a central database. The committee found that RE13 would provide additional flexibility, but was concerned that an electronic database would not be available in many communities. However, the language in RE13 would not require a database, but only make it an option in those jurisdictions that wanted to offer one. We have also deleted the land records requirement based on concerns expressed during testimony at the committee hearing.
- RE13 as modified would require more specific information on the certificate, such as the actual R-values or U-factors (or an area-weighted average), which should be easily obtainable at construction. These values will benefit homeowners over the life of the home by giving information important for equipment sizing, window replacement, and other upgrades to the home.

In sum, RE13 as modified incorporates the progress made with RE14 and RE16, and provides a more modern, more precise certificate requirement.

RE13-13

Final Action: AS AM AMPC____ D

RE17-13

R402.1 (IRC N1102.1), R402.1.1 (IRC N1102.1.1), Table 402.1.1 (IRC Table N1102.1.1) R402.1.2 (NEW) (IRC N1102.1.2 (NEW)), R402.1.2.1 (IRC N1102.1.2.1), R402.1.3 (IRC N1102.1.3), Table R402.1.3 (Table N1102.1.3), R402.1.4 (IRC N1102.1.4)

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (Jcrandell@aresconsulting.biz)

Revise as follows:

R402.1 (N1102.1) General (Prescriptive). The *building thermal envelope* shall meet the requirements of Section~~s~~ R402.1.1, R402.1.2, or R402.1.3 based on the climate zone specified in Chapter 3. ~~through R402.1.4.~~

R402.1.1 (N1102.1.1) ~~Insulation and fenestration criteria~~ *U*-factor method. ~~The *building thermal envelope* shall meet the requirements of Table R402.1.1~~ An assembly shall have a *U*-factor equal to or less than that specified in Table R402.1.1. In addition, glazed fenestration SHGC and the equivalent of slab insulation R-value and depth requirements in Table R402.1.2 shall be met. ~~based on the climate zone specified in Chapter 3.~~

R402.1.2 (N1102.1.2) R-value method. As an alternative means of complying with Section R402.1.1, insulation R-values, slab insulation depth, Fenestration U-factors and SHGC requirements shall comply with Table R402.1.2. Alternatives to the R-value requirements in Table R402.1.2 shall comply with Section R402.1.1.

~~R402.1.2 (N1102.1.2)~~ R402.1.2.1 (N1102.1.2.1) *R*-value computation. Insulation materials used in layers to provide~~, such as framing~~ the cavity insulation component or ~~and insulating sheathing~~ continuous insulation component required by Section R402.1.2, shall be summed to compute the corresponding component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

~~**R402.1.3 (N1102.1.3) *U*-factor alternative.** An with a *U*-factor equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the *R*-value in Table R402.1.1.~~

~~R402.1.4 (N1102.1.4)~~ R402.1.3 (N1102.1.3) Total UA method. ~~If t~~The total *building thermal envelope* UA (sum of *U*-factor times assembly area) ~~is~~ shall be less than or equal to the total UA resulting from using the *U*-factors in Table R402.1.~~2~~1 (multiplied by the same assembly area as in the proposed building)~~, the building shall be considered in compliance with Table R402.1.1~~. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The glazed fenestration SHGC and the equivalent of slab R-value and depth requirements in Table R402.1.2 shall be met in addition to UA compliance.

TABLE ~~R402.1.1 (N1102.1.2)~~ R402.1.2 (N1102.1.2)
INSULATION AND FENESTRATION R-VALUE REQUIREMENTS BY COMPONENT[a]

(Portions of table not shown remain unchanged)

TABLE ~~R402.1.3 (N1102.1.3)~~ R402.1.1 (N1102.1.1)
~~EQUIVALENT~~ ASSEMBLY U-FACTOR~~S~~ REQUIREMENTS[a]

(Portions of table not shown remain unchanged)

Reason: This proposal provides a needed re-organization and clarification of insulation requirements for the building thermal envelope. One of the technical concerns driving this proposal is that there are variations in the levels of efficiency between the current U-factor and R-value requirements. This happens as accommodations are made for common product R-value and various building methods. There are other proposals that are attempting to address these issues. Also, the R-value table is based on an insulation component approach using nominal R-values and the parameters and assumptions necessary to determine an equivalent U-factor are not disclosed in the code and are subject to varying interpretations. It was for this reason that the code has intended that the U-factor table serve as a baseline for alternative insulation strategies. This proposal clarifies that intent. From a formatting perspective, the proposal clearly delineates three methods for compliance. First, it establishes the U-factor method as the primary basis and approach for energy efficiency requirements. Second, the "cook-book" R-value approach is retained as simple means of complying with the required U-factors, also clarifying that alternative R-value solutions shall comply with the U-factor method. Third, it retains the total UA method and makes some editorial improvements.

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

R402.1-EC-CRANDELL

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disagreed that this re-organization is necessary. The technical requirements do not change, and the code is easily understood as it is presently organized.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay Crandell, P.E., ARES Consulting, representing the Foam Sheathing Committee of the American Chemistry Council requests Approval as Submitted.

Commenter's Reason: This proposal provides an improved format for the various methods of obtaining compliance by clarifying and distinguishing how the requirements are applied. These provisions have been the subject of confusion and varied interpretations. This proposal will help to remove the confusion and avoid conflicting interpretations, thus improving consistency of enforcement and use.

RE17-13
Final Action: AS AM AMPC____ D

RE19-13

Table R402.1.1 (IRC Table N1102.11), R401.2.3, (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Thomas S Zaremba, Roetzel & Andress, representing Pikington North America and AGC Glass Company North America (tzaremba@ralaw.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	FENESTRATION GLAZED FENESTRATION SHGC[b,e]	SKYLIGHT[b] U-FACTOR	~~GLAZED FENESTRATION SHGC[b,e]~~	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[i]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE
1	NR	≤ 0.25	0.75	~~0.25~~	30	13	¾	13	0	0	0
2	0.40	≤ 0.25	0.65	~~0.25~~	38	13	4/6	13	0	0	0
3	0.35	≤ 0.25	0.55	~~0.25~~	38	19	8/13	19	5/13[f]	0	5/13
4 except Marine	0.35	≤ 0.40	0.55	~~0.40~~	49	19	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	~~0.32~~ 0.25	NR	0.55	~~NR~~	49	30[g]	13/17	30[g]	15/19	10, 2 ft	15/19
	= 0.26	≥ 0.22									
	= 0.27	≥ 0.27									
	= 0.28	≥ 0.32									
	= 0.29	≥ 0.37									
	=0.30	≥ 0.42									
6	~~0.32~~ 0.25	NR	0.55	~~NR~~	49	30[g]	15/20	30[g]	15/19	10, 4 ft	15/19
	= 0.26	≥ 0.22									
	= 0.27	≥ 0.27									
	= 0.28	≥ 0.32									
	= 0.29	≥ 0.37									
	= 0.30	≥ 0.42									
7 and 8	~~0.32~~ 0.25	NR	0.55	~~NR~~	49	30[g]	19/21	38[g]	15/19	10, 4 ft	15/19
	= 0.26	≥ 0.22									
	= 0.27	≥ 0.27									
	= 0.28	≥ 0.32									
	= 0.29	≥ 0.37									
	= 0.30	≥ 0.42									

For SI: 1 foot = 304.8 mm. 30

a. *R*-values are minimums. Except as otherwise noted. *U*-factors ~~and SHGC~~ are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.

(*Portions of Table not shown remain unchanged)*

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	~~0.32~~ 0.25	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	~~0.32~~ 0.25	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	~~0.32~~ 0.25	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(*Portions of Table not shown remain unchanged)*

Reason: In northern climate zones 5 through 8, this proposal would reduce the prescriptive U-factor to a maximum of 0.25, but provide 5 alternative, U-factor and SHGC combinations that all yield equivalent energy performance to windows having a 0.25 U-factor. Adopting this proposal will provide builders and homeowners with the flexibility of selecting from a number of different frame and glass types to achieve significantly greater energy savings. Such flexibility will also significantly increase the number of products capable of achieving code compliance, thus, increasing competition and, ultimately lowering the cost of compliance.

In 2008, the United States Department of Energy released the results of a regression model developed by Lawrence Berkley National Laboratories (“LBNL”) revealing how changes in U-factor and SHGC affect aggregate energy consumption in northern climates. A detailed discussion of the model is found at http://windows.lbl.gov/EStar2008. The LBNL model clearly shows that in northern climates, a 0.05 increase in SHGC produces the same energy benefits as a 0.01 decrease in U-factor. Accordingly, windows with incrementally 0.01 higher U-factors and 0.05 higher SHGCs all yield the same energy benefits.

Using the results of the LBNL regression model, this proposal establishes a prescriptive 0.25 U-factor in zones 5 through 8 and then takes U-factors up in 0.01 increments from 0.25 to 0.30 while simultaneously raising minimum SHGCs in 0.05 increments. All of the matching U-factors and SHGCs will yield energy performance equivalent to the prescriptive 0.25 U-factor.

The US Energy Star Program has already implemented the results of the LBNL model and uses the same types of energy equivalent trade-offs in northern climates. In fact, trade-offs like those in this proposal have been in use in the United States Energy Star Windows Program ever since April 7, 2009, when the Department of Energy issued its Version 5.0 criteria for Energy Star Windows, Doors and Skylights. Indeed, the 0.27 U-factor coupled with a 0.27 SHGC and a 0.28 U-factor coupled with a 0.32 SHGC in the current proposal match the most recent Energy Star trade-offs released by the Environmental Protection Agency (EPA) in its Version 6.0, Draft 1 Energy Star criteria dated July of 2012. In addition to being used in the United States, the Canadian Energy Star Program also reaches essentially the same trade-off results, by matching higher U-factors with higher SHGC values through the application of a formulation known as Energy Ratings, or ERs.

Achieving a 0.25 U-factor is technologically feasible using a double, not a triple, glazed assembly. In fact, all five (5) of the primary glass manufacturers in the United States, offer a low-e coated glass made specifically for use on the #4 surface (or the surface found inside the home) of a double glazed assembly. In the right frame, advent of #4 surface low-e products enable windows to achieve a 0.25 or lower U-factors using double glazed windows. This proposal builds on that technology and the methodology in use in the U.S. Energy Star Windows Program since 2009 of pairing U-factors with SHGCs to yield an energy performance equivalent to a prescriptive U-factor. In this proposal, U-factors are matched to SHGCs to yield the equivalent energy performance of a 0.25 U-factor.

This proposal, if adopted, will significantly increase builder and consumer choice, ultimately lower the costs of code compliance and significantly reduce the aggregate amount of energy consumed by homes in the United States.

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

R402.1.1T#2-EC-ZAREMBA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: These types of options can be accomplished through the performance path. It is not necessary to install this set of options in the minimum requirements table.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas S. Zaremba, Roetzel & Andress, representing NSG Group/Pilkington North America, Inc. and AGC Glass Company North America, Inc., requests Approval as Submitted.

Commenter's Reason: Thirteen years ago, the 2000 IECC established a minimum U-factor of **0.35**[a] for residential windows throughout most of zones 5 through 8. Since then, almost **no** progress has been made in increasing the stringency of northern residential windows. Even now, the 2012 IECC only prescribes a minimum U-factor of **0.32** for residential windows in zones 5 through 8! This represents **less than** a 9% increase in stringency, over the last 13 years.

For the following reasons, RE19-13 should be adopted "as submitted" at the Final Action hearings.

1. The adoption of this proposal would significantly increase the stringency of northern residential windows while significantly increasing the number of window choices available to homebuilders and homeowners alike.
2. Under the IECC and IRC, every window must bear a National Fenestration Rating Council (""NFRC") label showing its U-factor and SHGC. This mandatory labeling system makes it easy for builders and code officials alike to verify that a window's U-factor and SHGC complies with the values set out in the proposal.
3. All five primary glass manufacturers operating in the United States offer coated glazings capable of meeting the matching U-factor and SHGC values set out in the proposal.
4. Windows with any of the matching U-factors and SHGC values in the proposal, which range from 0.25 to 0.30 U-factor, will all deliver the same energy performance. This is established in a report prepared for the U.S. Department of Energy by Lawrence Berkley National Laboratories which can be found at http://windows.lbl.gov/EStar2008. This report has been used by the Energy Star Windows program as the basis for matching U-factors with SHGCs to award Energy Star labels to a variety of windows capable of delivering equivalent energy performance since 2009.

[a]Based on a 15% window to gross exterior wall area.

RE19-13
Final Action: AS AM AMPC____ D

RE20-13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40[j]	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35[j]	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	~~0.32~~ 0.25	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	~~0.32~~ 0.25	0.55	NR	49	20+5 or 13+5[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	~~0.32~~ 0.25	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	~~0.32~~ 0.25	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	~~0.32~~ 0.25	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	~~0.32~~ 0.25	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: The purpose of this proposal is to provide the next step in energy efficiency for windows in the northern zones. Window technology has advanced in recent years, allowing multiple new options to achieve higher performance levels at reasonable cost. Specifically, a 0.25 U-factor can be achieved by triple glazing, but it may also be achieved in double glazing by using new high performance frames and spacers, or also by the using two low-e coatings. These "4th surface" low-e coatings are now available from all five of the primary glass manufacturers. While total window costs vary widely based on specific product, window manufacturer, and location, public cost data shows the incremental cost for adding a low-e coating is fairly consistent between $0.25 to $2 per ft2. [1] A reasonable estimate of the incremental cost is $1.50 per ft2, or approximately $30 per window. This is consistent with the estimate by D&R International for the Energy Star Windows program, which estimated the incremental cost for a 0.27 U-factor at $34 per window. [2] For 12 different cities in zones 5-7, a RESFEN analysis estimates the energy savings at $32-73 per year for a typical 2000 ft2 home with 300 ft2 of windows, with an average payback of 11 ± 3 years, not including any fuel price escalation or future decrease in low-e pricing. A cash flow or ROI analysis would show even more favorable results.

1. Derived from the ASHRAE 90.2 cost database for identical windows with low-e vs. clear glazing, with costs updated to 2011 basis. (See http://bc3.pnnl.gov, Economic Database in Support of ASHRAE 90.2, Research Project 1481 prepared by the NAHB Research Center.)
   Similarly, data for 6 mm commercial glazing shows a range of $0-4 per ft2, which is generally consistent since commercial glazing will be higher than residential. Derived from (a) CASE report for Nonresidential & High-Rise Residential Fenestration Requirements, California Building Energy Efficiency Standards, Sep 2011, and (b) draft Commercial Building Envelope Cost Data Collection, prepared for Pacific Northwest National Laboratory by Faithful & Gould, Dec 2011.
   In some cases, a 4th surface low-e and a #2 double silver low-e are less expensive than just a #2 triple silver low-e alone, meaning there is no incremental cost.

2. *ENERGY STAR Program Windows, Doors, and Skylights, Version 6.0 Draft 1 Criteria and Analysis Report*, D&R International for the U.S. Department of Energy, July 2012.

Cost Impact: This proposal will increase the cost of construction.

R402.1.1T#1-EC-CULP

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: From the testimony provided, there seemed to be some strong disagreement on the cost data provided. This reduction in fenestration U-Factor is too drastic. The technology to achieve this is not proven.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas S. Zaremba, Roetzel & Andress, representing NSG Group/Pilkington North America, Inc. and AGC Glass Company North America, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	*(remainder of table unchanged)*
1	NR	0.75	0.25	
2	0.40	0.65	0.25	
3	0.35	0.55	0.25	
4 except Marine	0.35	0.55	0.40	
5 and Marine 4	~~O.25~~ 0.32	0.55	NR	
6	0.25	0.55	NR	
7 and 8	0.25	0.55	NR	

TABLE R402.1.3
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	*(remainder of table unchanged)*
1	0.50	0.75	
2	0.40	0.65	
3	0.35	0.55	
4 except Marine	0.35	0.55	
5 and Marine 4	~~0.25~~ 0.32	0.55	
6	0.25	0.55	
7 and 8	0.25	0.55	

Commenter's Reason: Thirteen years ago, the 2000 IECC established a minimum U-factor of **0.35**[a] for residential windows throughout most of zones 5 through 8. Since then, almost no progress has been made in increasing the stringency of northern residential windows. The 2012 IECC only prescribes a minimum U-factor of **0.32** for residential windows in those zones! This represents **less than** a 9% increase in stringency, over the last 13 years. In contrast, in the south, (where U-factor is far less significant) U-factor stringency has increased by more than 45%![b]

The original proposal would have reduced residential window U-factors in zones 5 through 8 from 0.32 to 0.25. The modification proposed with this Public Comment would restore the 0.32 U-factor in zone 5 and only change zones 6 through 8 to a 0.25 U-factor.

I urge you to vote against the standing motion to disapprove in order to vote in favor of a motion to approve R20-13 "as modified" for the following reasons:

1. Climate zones 7 and 8 are Alaska. Climate zones 6 and 7 span much of the border between the continental United States and Canada. By limiting this proposal to Climate zones 6-8, only the coldest parts of the United States, greater than 7200 HDD65°F, are targeted for a 0.25 U-factor.
2. A 0.25 U-factor in these climate zones would dramatically reduce northern energy consumption. A 0.25 U-factor is less than a 30% increase over the 2000 IECC, far less than the 45% increase in southern U-factor stringency since 2000.
3. A 0.25 U-factor can be achieved in many ways. Triple glazed windows can easily achieve a 0.25 U-factor. So can double glazed windows with a low-e coating on the inside layer of the first window and a second low-e coating on either side of the second window. All five primary glassmakers operating in the United States offer the coatings necessary to manufacture these double and triple glazed windows.
4. Northern residential windows represent one of the last "low hanging fruits" on the residential energy code tree. It should be picked now. If it isn't, we won't have another chance until 2018. Between now and 2018, it is likely that a million or more new homes will be added to the building stock in climate zones 6 through 8 and all of them will miss this opportunity to save a significant amount of energy.

In disapproving this proposal, the Committee was concerned about an estimated 11-year payback to achieve this increased U-factor. However, by limiting the proposal to zones 6-8, a shorter payback period of approximately 9 years is expected because the anticipate energy savings in these far northern climate zones will be larger.

The Committee was also concerned that the proposal was "too drastic," although it did not explain why. If it was concerned because of its effect on a large segment of population found in climate zone 5, the modification proposed with this Public Comment eliminates zone 5 from the proposal. If the Committee meant that the percentage increase in stringency is "too drastic," the Committee, simply, failed to realize how little progress has been made in northern window stringency over the last 13 years.

Finally, the Committee was concerned that the "technology to achieve this is not proven." On this point, the Committee is just wrong. Triple glazed window units have been in use for decades and double glazed units with low-e coatings on two surfaces have been in use since at least 2009.

I urge you to pick the low hanging energy fruit available in the north by voting "NO" on the standing motion to approve the Committee's recommendation and voting "YES" on a motion to adopt R20-13 "as modified" by this Public Comment.

a. Based on a 15% window to gross exterior wall area.
b. Zone 2 has moved from a 0.75 U-factor in 2000, to a 0.40 U-factor in 2013.

RE20-13

Final Action: AS AM AMPC____ D

RE22-13
Table R402.1.1 (IRC Table N1102.1.1)

Proposed Change as Submitted

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	Max 0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	Max 0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	Max 0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	Min 0.25 ~~NR~~	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	Min 0.25 ~~NR~~	49	20+5 or 13+5[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	Min 0.25 ~~NR~~	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors are maximums. ~~and~~ SHGC are maximums ("max") or minimums ("min") as noted. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-values of the insulation shall not be less than the *R*-value specified in the table.

(Portions of Table not shown remain unchanged)

Reason: The 2012 IECC made a significant change by lowering the maximum SHGC in zones 1-3 to 0.25. While this reduces energy use for cooling-dominated homes in the south, the combination of this low SHGC in the south with the "NR" no requirement in zones 5-8 creates a loophole that actually harms energy efficiency in the north.

Windows are generally distributed through national networks, and the “NR” allows the same ultra-low SHGC window designed for the south to also be used in the north. However, the performance of homes is simply not the same in Arizona and Vermont. A 0.25 SHGC window will permanently block 75% of the sun’s energy from entering the home for the full life of the window. In Arizona, this is very beneficial for reducing cooling loads, but in Vermont, this significantly hinders the use of free solar energy to reduce heating loads that must otherwise be met using fossil fuels. If ultra low SHGC windows intended for the south are used in the north, it will increase annual energy consumption, rather than conserve it.

This is not just a hypothetical problem. An analysis conducted for EPA in support of the Energy Star Windows program determined that the mean and median SHGC of Energy Star double hung windows from the top 20 window manufacturers is only 0.22. [1] This is clear evidence that national window manufacturers are largely limiting their inventories to a single very low SHGC product that can meet code in all climate zones, regardless of the impact on energy efficiency for a specific location.

In its technical support for the Energy Star Windows program, Lawrence Berkeley National Laboratory (LBNL) has consistently determined that higher solar heat gain saves more energy in the north. In fact, in the latest analysis of August 2012, LBNL concluded that setting a minimum SHGC of 0.35 in the north would double the national aggregate energy savings resulting from the proposed new criteria. [2]

Nonetheless, this proposal seeks to be more moderate, and just establish a base level minimum SHGC to ensure that ultra-low SHGC windows are not inappropriately used in the north. Both EPA and Natural Resources Canada have established a minimum SHGC for the Energy Star Most Efficient designation.[3] A minimum 0.25 SHGC is parallel to the maximum 0.25 SHGC in the south, will ensure different glazing packages are used for the south and north, and includes low-e products available from all glass manufacturers with both high solar gain products for passive solar design and solar control products to mitigate summer peak loads.

This problem has increased as SHGC requirements in the south have decreased in both the IECC and Energy Star. The code must now address this problem and recognize that using the same low SHGC glazing in Phoenix and Boston makes no sense.

1. *Technical Support for ENERGY STAR Windows Version 6.0 Specification Revision*, Lawrence Berkeley National Laboratory and D&R International, July 1, 2012, p. 2.
2. EPA’s ENERGY STAR for Windows, Doors and Skylights Draft 1 Criteria and Analysis Report Stakeholder’s Meeting, *Energy Star Program Savings Estimates*, Lawrence Berkeley National Laboratory, August 27, 2012, slide 98.
3. http://www.energystar.gov/ia/partners/downloads/EPA_Memo_ENERGY_STAR_Most_Efficient_2013.pdf

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

R402.1.1T#2-EC-CULP

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that the availability of materials, and the cost effectiveness of this proposed revision is in question.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas S. Zaremba, Roetzel & Andress, representing NSG Group/Pilkington North America, Inc. and AGC Glass Company North America, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	*(remainder of table unchanged)*
1	NR	0.75	Max 0.25	
2	0.40	0.65	Max 0.25	
3	0.35	0.55	Max 0.25	
4 except Marine	0.35	0.55	Max 0.40	
5 and Marine 4	0.32	0.55	Min 0.25	
6	0.32	0.55	Min 0.25	
7 and 8	0.32	0.55	Min 0.25	

a. R-values are minimums. U-factors are maximums. SHGC are maximums ("max") or minimums ("min") as noted. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-values of the insulation shall not be less than the R-value specified in the table.

Commenter's Reason: Please note that the only change made to the original proposal is to add "Max" to SHGC in climate zone 4, since it was inadvertently left out of the original proposal.

A 0.25 SHGC window means that it will only allow 25% of the sun's energy into a home. In other words, it blocks 75% of the sun's energy.

In the south, blocking the sun's energy is important to keep air conditioning loads as low as possible. For that reason, the IECC and IRC prescribe a maximum 0.25 SHGC in climate zones 1 through 3.

However, while the use of low SHGC windows to block the sun's energy is "smart" in the south, it is not smart in the north. In the north, allowing the sun's energy into a home reduces winter heating loads and, thus, reduces energy consumption. According to Lawrence Berkley National Laboratories, in a report prepared for the Environmental Protection Agency ("EPA") in connection with its Energy Star Windows Program, including a minimum SHGC in the north, instead of "no rating," would result in "significantly larger" energy savings.[a]

So, does it make any sense to use the same 0.25 SHGC windows in the north that the IECC and IRC prescribe for use in the south? No. Nevertheless, both the IECC and IRC prescribe "no rating" for SHGC in climate zones 5 through 8 and, in doing so, they allow windows with **any** SHGC to be used in the north, including the ultra-low 0.25 SHGC windows they prescribed in the south.

In a recent study prepared for the EPA's Energy Star Windows Program, D&R International found that the mean and median SHGC of windows being sold, nationwide, by the top 20 window manufacturers in the United States is 0.22. This is significant because it means that window manufacturers are, in fact, taking the same low SHGC windows prescribed by the IECC and IRC for use in the south, and selling them to homeowners in the north. While this may be convenient for window manufacturers, since they can sell the same window in Alaska that they are required to sell in Miami, it wastes a huge amount of energy in the north. It also costs northern homeowners a lot more to heat their homes in the winter.

If adopted, this proposal would prescribe a minimum 0.25 SHGC in climate zones 5 through 8. While such a minimum in the north would eliminate the use of the ultra-low SHGC windows that the IECC and IRC prescribed in climate zones 1 through 3, it would still allow numerous solar control windows to be used in the north, including almost all windows that currently enjoy an Energy Star label.

The Committee disapproved this proposal, saying that it was "concerned that the availability of materials, and the cost effectiveness of this proposed revision is in question."

The Committee got this one wrong. All five primary glass manufacturers operating in the United States manufacture glass with coatings that are capable of delivering SHGCs greater than 0.25. PPG Industries, Guardian Industries, Cardinal Glass, NSG/Pilkington and AGC Glass Company **all** offer such products. A quick review of product availability on their websites indicate that these glass companies offer **dozens** of different products capable of delivering a minimum 0.25 SHGC.

With all of these glass companies offering numerous products capable of delivering SHGCs greater than 0.25, the Committee's reasons for disapproving this proposal are, simply, unfounded.

This simple change will save significant amounts of energy in the north and lower homeowners heating bills, all with no increase whatsoever in the cost of construction.

I urge you to vote against the standing motion and to vote in favor of RE22-13 "as modified."

a. EPA's Energy Star for Windows, Doors and Skylights Draft 11 Criteria and Analysis Report Stakeholder's Meeting, *Energy Star Program Savings Estimates,* Lawrence Berkeley National Laboratory, August 27, 2012, slide 98.

RE22-13

Final Action: AS AM AMPC____ D

RE26-13
Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3, (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu); Brenda A. Thompson, Clark County Building Department, Las Vegas NV, representing the ICC Sustainability, Energy & High Performance Code Action Committee (SEHPCAC) (bat@clarkcounty.gov); Mark Halverson, APA-The Engineered Wood Association & Loren Ross, The American Wood Council.

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	~~20 or 13+5[h]~~ 13	8 / 13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	~~0.057~~ 0.082	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

Reason.
Ellis: We support the Department of Energy's code change proposal (EC13) for the 2012 IECC that held the wood frame wall R-value at R-13 in Table R402.1.1. The increase in R-values in Climate Zone 3 in wood frame walls is just not cost effective and shown to have a payback period of over 35 years. When analyzing the construction cost vs. energy savings, the simple payback can potentially be longer than the expected life of the home. This payback will be unacceptable to most homebuyers.

There are other areas within buildings where energy conservation can be increased such as energy efficient equipment or higher quality windows which can be provide a payback that will be more acceptable to most homebuyers.

Thompson: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee

SEHPCAC: The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

DOE did not propose changing the value for **Climate Zone 3** in EC13 for the 2012 cycle. This is completely compatible with the DOE proposal which is attached on the following pages.

The cavity only entries proposed for **Climate Zone 6, 7, and 8** are reflective of the cavity only changes proposed for the Commercial chapter for RESIDENTIAL.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Halverson-Ross: We support the U.S. Department of Energy's position for Climate Zone 3, as stated in EC13-09/10 that held the wood frame wall *R*-value at R13 in Table R402.1.1. The increase in *R*-values for Climate Zone 3 wood frame walls is not cost effective and is shown to have a payback period of over 35 years. When analyzing the construction cost vs. energy savings, the simple payback can potentially be longer than the expected life of the home.

The National Association of Home Builders Research Center estimated the cost to builders to increase the wood framed wall *R*-value from R13 to R20 to be $1.33 per square foot of wall or approximately $3,433 per house. The total increase in cost for the builder to meet the 2012 IECC requirements compared to meeting the 2009 IECC requirements was estimated to be $7,203. So the cost of increasing just the insulation in the walls was nearly 50% of the total cost of meeting all of the provisions of the 2012 IECC in Climate Zone 3 while the energy savings of the increased wall insulation was only estimated to contribute 10% of the total energy savings.

This payback will be unacceptable to nearly all consumers. With energy savings only running between $2 and $5.50 per month in Climate Zone 3, we urge the code body to approve this proposal with the modification made in this Public Comment.

We ask the support of the committee for this proposal.

Cost Impact:
ELLIS: None.
THOMPSON: This code change will decrease the cost of construction.
HALVERSON-ROSS: This code change proposal will not increase the cost of construction.

R402.1.1T-EC-ELLIS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This proposal would constitute an extreme roll-back in the energy efficiency requirements of the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Mark Halverson and Paul Coats, representing APA-The Engineered Wood Association, American Wood Council (AWC) request Approval as Submitted.

Commenter's reason: We stand on the original proposal which failed by one vote to get the backing of the Residential Committee. The energy cost savings in this mild climate of going from R-13 to R-20 walls has been estimated to be $42.60 per year for a 2,000 square foot house. The cost for builders to go from 2x4 to 2x6 construction in an average house of this size has been estimated by the National Association of Home Builders to be over $2,930.00. Even if the actual cost is only half that number, or $1,465, it would still take over 34 years for a simple payback on the increased cost of construction. If 4% annual interest is applied to the additional $1,465 of a 30-year mortgage, the energy savings of $42.60 fails to even cover the $59 annual cost of the additional mortgage. So, proposing that wood frame walls be insulated at R-13 instead of R-20 in Climate Zone 3 hardly represents an extreme roll-back in energy savings; especially considering the added cost of construction.

This proposal does not drastically impact energy savings and will decrease the cost of construction, resulting in more affordable housing for first-time homeowners.

Public Comment 2:

Shirley Ellis, Energy Systems Laboratory, Texas A&M University System, representing self, requests Approval as Submitted.

Commenter's reason: The Department of Energy's code change proposal (EC13) for the 2012 IECC retained the wood frame wall R-value in Table R402.1.1 at R-13 in Climate Zone 3. The energy efficiency achieved in this climate zone is not justified by the cost to increase the R-values.

The reason given by the committee for disapproval is that the proposal "would constitute an extreme roll-back in the energy efficiency requirements of the code".

An impact of wall insulation requirements specified in Table R402.1 of the 2012 IECC (i.e., R-20 or R-13+5 for wood frame wall R-value) were calculated using a 2012 IECC performance path code-compliant single-family residential building in Dallas, TX (Climate Zone 3). The base-case building was assumed to be a 2,325 sq. ft., square-shape, one story, single-family, detached house. A series of simulation was performed, including R-13 with 2X4 (16"), R-13+5 with 2X4 (16"), R-20 with 2X6 (16"), and R-20 with 2X6 (24"). Two options based on the choice of heating fuel type were considered: (a) an electric/gas house (gas-fired furnace for space heating, and gas water heater for domestic water heating), and (b) an all-electric house (heat pump for space heating, and electric water heater for domestic water heating).

Figure 1 and 2 summarize the results of simulations for both electric/gas and all-electric house, including: the annual site energy consumption by end-uses and the total; and the annual source energy consumption by fuel types and the total, respectively. Figure 2 also shows the calculated source energy (cooling, heating and DHW) percentage difference against the R-13+5 test case.

Public Comment 3:

Greg Johnson, Johnson Consulting Services, representing the Coalition for Fair Energy Codes, requests Approval as Submitted.

Commenter's Reason: RE26 attempts to correct an energy code that is out of touch with both the economic realities facing many communities and the lack of local government political will to erect additional financial barriers to home ownership. This is particularly true in Climate Zone 3 where adoption of the 2012 IECC's prescriptive wall insulation requirements have been almost universally rejected.

RE26 would return the prescriptive R-value and equivalent U-factor requirements to those of the 2009 IECC; requirements that the Department of Energy **did not** ask to be made more stringent. There could be no more reasonable change offered than RE26 which says, essentially, that we won't make people pay for something for which they will see little benefit and which many cannot afford.

The Energy Systems Laboratory of Texas A & M University (ESL) evaluated the percentage of contribution to improved energy efficiency of specific 2012 IRC (2012 IECC Residential) stringency measures over a 2009 IRC (2009 IECC Residential) baseline in Climate Zone 3. The analyzed measures include: increased roof insulation; increased wall insulation; decreased window U-factor; decreased window SHGC; decreased air infiltration; and, decreased duct leakage. Those results are reported in Table 1.

The National Association of Home Builders Research Center estimated the incremental cost to builders to provide each of the ESL specified stringency measures. Those results are also reported in Table 1.

Comparing the cost of each building stringency measure to the ESL modeled energy savings shows that the cost of increasing wall insulation stringency from R-13 to R-20 far exceeds the benefit when compared to other energy efficiency measures. The cost of providing R-20 walls is almost twice that of any other 2012 stringency measure yet it returns only 12 percent of the total savings identified by ESL.

Assuming 5% interest, the cost of R-20 is $1,736 over a 30 year mortgage, which is $11.13 per month for 360 payments for a grand total cost of $4,005.92 with $1,527.78 in total interest paid. The total estimated monthly energy cost savings delivered by the 2012 IECC residential provisions are projected to be $276 annually or $23.00 monthly (see Calculation 1) for Climate Zone 3. Given an 11.8% contribution to those energy savings, R-20 walls will save the building owner only $2.72 per month, an insufficient return for an $11.13 per month investment. **In other words, for R-20 walls, the 2012 IECC requires owners in Climate Zone 3 to spend $4,000 to save less than $980 over the term of a 30 year mortgage.**

As an alternate methodology, for simple payback, Calculation 1 results in a 53 year payback for the additional expense of R-20 walls in Climate Zone 3, well beyond the length of a typical mortgage.

CALCULATION 1
Climate Zone 3 Increased Wall Insulation Savings and Simple Payback

	Cooling	Heating
2009 IECC end use site energy consumption[1]	14.7 MMBtu/yr	44.7 MMBtu/yr
2012 IECC end use site energy consumption[1]	- 10.5 MMBtu/yr	- 30.6 MMBtu/yr
Savings	4.2 MMBtu/yr	14.1 MMBtu/yr
Conversion Factor (divide by)[2]	3412	100,000
Equivalent Units	1231kWh	141 Therms
Unit Cost[3]	x $0.11	x $1.00
Annual Savings ($135 + $141 = $276)	$135	$141
12 % savings from increased wall insulation[4]	.118	.118
Annualized savings of increased wall insulation	$15.93	$16.64
Total wall insulation cooling + heating annual savings	$32.57	
Monthly savings ($23.57/12)	$2.71	
Simple payback = initial cost of wall assembly change divided by total annual savings ($1,736[4] / $32.57/yr) =	53 years	

1. *A Comparison Of Building Energy Code Stringency: 2009 IRC Versus 2012 IRC For Single-Family Residences In Texas*; TX A & M Energy Systems Laboratory, December 2011, http://www.seco.cpa.state.tx.us/tbec/docs/2012_iecc_esl_technical_review.pdf
2. *ENERGY STAR Challenge for Industry QuickConverter;* http://www.energystar.gov/index.cfm?c=industry_challenge.take_the_challenge
3. Table 2
4. Table 1

TABLE 1: CLIMATE ZONE 3 COST BENEFIT ANALYSIS FOR SPECIFIC STRINGENCY MEASURES						
Texas A & M Energy Systems Laboratory building assumptions[1]: 2,325 sq. ft., square-shape, one story, single-family, detached house with 15% glazing, gas fired space heating, electric cooling						
2012 IRC (IECC Residential) stringency measure[1]	Source savings above 2009 IRC (IECC Residential) percentage of improvement[1]	Percent of contribution to savings	Area per ESL building assumptions	Unit Cost[2]	Stringency measure cost	Percent of total cost
Increased roof insulation	1.1	7.6	2,235[sf]	$.25	$581	12.5
Increased wall insulation (R-13 to R-20)	1.7	11.8	1,305[sf] opaque	$1.33	$1,736	37.3
Decreased window U-Factor	2.9	20.1	230[sf]	$2.50	$575	12.4
Decreased window SHGC	.8	5.6				
Decreased air infiltration	6.4	44.4	2,235[sf]	$.41	$ 953	20.5
Decreased duct leakage	3.6	25.0	Per house[2]	$800	$800	17.2
Total per ESL	14.4				$4,645	

1. *A Comparison Of Building Energy Code Stringency: 2009 IRC Versus 2012 IRC For Single-Family Residences In Texas*; TX A & M Energy Systems Laboratory, December 2011, http://www.seco.cpa.state.tx.us/tbec/docs/2012_iecc_esl_technical_review.pdf
2. *2012 IECC Cost Effectiveness Analysis;* NAHB Research Center, May 2012 http://reca-codes.org/PDF/NAHB%202012%20IECC%20Cost%20Effectiveness%20Analysis.pdf

TABLE 2: CLIMATE ZONE 3 FUEL PRICES BY STATE[1]			
State	**Electricity ($/kWh) (Heating)**	**Electricity ($/kWh) (Cooling)**	**Gas ($/Therm)**
Alabama	0.106	0.109	1.329
Arkansas	0.08	0.092	0.924
California	0.149	0.156	0.943
Georgia	0.098	0.109	1.249
Louisiana	0.081	0.092	0.933
Mississippi	0.098	0.102	0.848
New Mexico	0.099	0.116	0.791
North Carolina	0.097	0.103	0.992
South Carolina	0.107	0.106	1.018
Tennessee	0.095	0.095	0.862
Texas	0.11	0.12	0.814
Average	**0.101**	**0.109**	**0.973**

1. Extracted from Table 5-1 of *Cost-Effectiveness Analysis of the 2009 and 2012 IECC Residential Provisions – Technical Support Document;* Pacific Northwest National Laboratory, April 2013. http://www.energycodes.gov/sites/default/files/documents/State_CostEffectiveness_TSD_Final.pdf

Rejection of the 2012 IECC means that less costly but important energy saving measures like improved air sealing and blower door testing, duct sealing, better performing windows, and higher efficacy lighting sources are not being adopted. An energy code that is not adopted saves no energy.

Please support a return to reasonable energy code provisions in Climate Zone 3 and vote for this public comment for RE26 - As Submitted.

Public Comment 4:

Tim Ryan, International Association of Building Officials requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	13	8 / 13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	~~20 or 13+5[h]~~ 13	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.082	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	~~0.057~~ 0.082	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

Commenter's Reason: The International Association of Building Officials is submitting this public comment to modify RB26 to include changes to climate zone 4 values in TABLE R402.1.1 related to wall cavity insulation. The proponent of RE26 accurately described the issues related to the cost benefit analysis associated with an increase in R values from R-13 to R-20 in wood frame wall construction. The same argument can be made to similar changes associated with climate zone 4. Further, IABO agrees with the proponent's reason statement where they indicated there are other areas within the building where energy conservation can be increased. In addition to the proponent's reason statement, the

International Association of Building Officials submits that this proposed modification more appropriately reflects the amendments being made by jurisdictions when adopting the 2012 IECC.

EC13 was the primary change that created substantial changes within the 2012 IECC. The proponent of that change offered no specific data to support the extreme changes to wall cavity insulation. We do not believe that such an extreme change is warranted based on the cost of construction in conjunction with the benefit that is achieved. IABO supports the IECC philosophy that the energy package of a building is a system consisting of multiple parts including the tightness of the thermal envelope and duct system, the sizing of the equipment and duct system, etc., all working together. We do not believe it is necessary to increase the cavity insulation to these extremes to achieve the desired level of energy efficiency.

RE26-13

Final Action: AS AM AMPC____ D

RE28-13

Table R402.1.1 (IRC Table 1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	~~38~~ 30	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	~~38~~ 30	20 or 13+5[h]	8 / 13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	~~49~~ 38	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	~~49~~ 38	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	~~0.030~~ <u>0.035</u>	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	~~0.030~~ <u>0.035</u>	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	~~0.026~~ <u>0.030</u>	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	~~0.026~~ <u>0.030</u>	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: There were four changes in the Ceiling R-value requirements in the 2012 IECC Edition, none of which should have been considered cost-effective. An energy and cost analysis was performed to show that the simple paybacks are in the 80-130 year range.

Climate Zone	Representative City	Change	Energy Savings	Incremental Cost	Simple Payback
2	Orlando, FL	R-38->R-30	$10/yr	$1,305	130 years
3	Atlanta, GA	R-38->R-30	$16/yr	$1,305	82 years
4	Richmond, VA	R-49->R-38	$15/yr	$1,379	92 years
5	Indianapolis, IN	R-49->R-38	$15/yr	$1,379	92 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481. Vaulted or cathedralized ceiling are very problematic when trying to achieve R-49 which is about 16 inches thick. This would require a rafter at least 17" tall (which does not exist) or an insulated panel, which represents a very small portion of the market.

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

R402.1.1T#6-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal would constitute a roll-back in the energy efficiency requirements of the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Ryan, International Association of Building Officials requests Approval as Submitted.

Commenter's Reason: There were four changes in the Ceiling R-value requirements in the 2012 IECC Edition, none of which should have been considered cost-effective. An energy and cost analysis was performed to show that the simple paybacks are in the 80-130 year range.

Climate Zone	Representative City	Change	Energy Savings	Incremental Cost	Simple Payback
2	Orlando, FL	R-38->R-30	$10/yr	$1,305	130 years
3	Atlanta, GA	R-38->R-30	$16/yr	$1,305	82 years
4	Richmond, VA	R-49->R-38	$15/yr	$1,379	92 years
5	Indianapolis, IN	R-49->R-38	$15/yr	$1,379	92 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481. Vaulted or cathedralized ceiling are very problematic when trying to achieve R-49 which is about 16 inches thick. This would require a rafter at least 17" tall (which does not exist) or an insulated panel, which represents a very small portion of the market.

RE28-13
Final Action: AS AM AMPC____ D

RE29-13

Table R402.1.1, (IRC Table N1102.1.1), R402.2 (IRC N1102.2), R402.2.13 (NEW) (IRC N1102.2.13 (NEW))

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (Jcrandell@aresconsulting.biz)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY

(Portions of Table not shown remain unchanged)

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. See Section 402.2.13 for cases where thickness of continuous insulation is varied to maintain a consistent overall sheathing thickness on walls intermittently braced with structural sheathing panels. ~~If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.~~

R402.2 (N1102.2) Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through ~~R402.2.12~~. R402.2.13

R402.2.13 (N1102.2.13) Continuous insulation on walls with intermittent structural sheathing. Where an exterior wall is intermittently braced with structural sheathing, the R-value of continuous insulation required by Table R402.1.1 shall be permitted to be reduced in the locations where structural sheathing is used in order to maintain a consistent total sheathing thickness when:

1. The overall U-factor of the opaque assembly, including areas with and without structural sheathing, is equal to or less than the required U-factor in Table R402.1.3 and
2. The assembly is in compliance with the vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section 1405.3 of the *International Building Code* as applicable.

Reason: This proposal corrects a discrepancy where frame wall assemblies using component insulation R-values allowed under existing footnote (h) are not currently equivalent to U-factors in Table R402.1.3.

Cost Impact: The code change proposal may increase the cost of construction.

Note: If this change is approved, the proposed Item 2 to Section N1102.2.13 would be shown in Chapter 11 of the IRC without the reference to the IBC as follows:

2. The assembly is in compliance with the vapor retarder requirements of Section R702.7.

R402.1.1T-EC-CRANDELL

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The flexibility for structural panels in the current footnote is necessary, especially in high seismic zones.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jay Crandell, Ares Consulting, representing the Foam Sheathing Committee of the American Chemistry Council, requests Approval as Submitted.

Commenter's Reason: Footnote 'h' as currently written results in combinations of continuous insulation thickness (R-value) over brace panels and not over brace panels that result in a total wall assembly that is not consistent with the R-value or U-factor options. This proposal removes this technical inconsistency, yet allows the development of numerous practical prescriptive solutions to achieve the ability to use foam sheathing with any bracing approach. It also provides an important link to vapor retarder provision in the building code which may limit the amount of R-value reduction for continuous insulation depending on the climate zone and vapor retarder approach. This is important for proper code coordination, enforcement, and implementation.

Public Comment 2:

Stephen Turchen, Fairfax County VA, representing Virginia Building and Code Officials Association requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

(Portions of Table not shown remain unchanged)

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. See Section 402.2.13 for cases where thickness of continuous insulation is varied to maintain a consistent overall sheathing thickness on walls intermittently braced with structural sheathing panels.

R402.2 (N1102.2) Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.13.

R402.2.13 (N1102.2.13) Continuous insulation on walls with intermittent structural sheathing. Where an exterior wall is intermittently braced with structural sheathing in accordance with the requirements of the *International Residential Code or International Building Code for wall bracing*, the R-value of continuous insulation required by Table R402.1.1 shall be permitted to be reduced in the locations where structural sheathing is used in order to maintain a consistent ~~total~~ overall sheathing thickness ~~when:~~ on the wall.

~~1. The overall U-factor of the opaque assembly, including areas with and without structural sheathing, is equal to or less than the required U-factor in Table R402.1.3 and~~
~~2. The assembly is in compliance with the vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section 1405.3 of the *International Building Code.*~~

Commenter's Reason: We consider the revised footnote "h" and the new Section R402.2.13 to be a worthwhile improvement over the present poor language of footnote "h". In its present form, attempting to enforce the footnote will become unnecessarily confusing and burdensome to building department personnel.

The term "structural sheathing" is retained in RE29 but is not a defined term in the IECC or IRC or IBC. The revision to the new Section R402.2.13 clarifies that the code is addressing sheathing products only in the context of the wall bracing requirements of the IRC or IBC.

We believe that the two conditions qualifying Section R402.2.13 are unnecessary. Condition 1 imposes an unnecessarily complex burden on the code official. A demonstration of compliance with the applicable U-factor under Section and Table R402.1.3 will be required in all cases where this provision is invoked, and it may be difficult to meet the U-factor criterion because structural sheathing products do not generally have the R-values of the continuous insulation products. In addition, a demonstration of compliance with R402.1.3 will require computation of wall areas, framing factors, R-values for all construction elements other than insulation, etc., a detailed and complex and time-consuming process. We do not consider the small increase in overall wall U-factor anticipated from using Section R402.2.13 as having a significant impact on overall energy use of the residential structure.

Condition 2 is unnecessary because it is already a part of the IRC and IBC. If your structure is in CZ M4 through 8, you must adhere to the applicable vapor retarder requirements. In those cases in those zones where a Class III vapor retarder is selected in lieu of Class I or II, only some construction options require a minimum R-value for insulated sheathing. These situations can be specifically addressed by the designer and code official and may preclude the use of R402.2.13.

The content of RE29, as modified above, provides, in our opinion, the only viable solution to integrating structural wall bracing and continuous insulation that can be easily and properly codified with a minimal impact on energy conservation: You must use one of the intermittent bracing methods permitted under the IRC or IBC. These methods insure that there will be "blank space" on the exterior walls. Fill in the blank spaces with the required continuous foam sheathing and you are done. If the thicknesses of the two sheathing materials are intelligently coordinated, you will end up with an opaque wall of uniform thickness throughout.

Absent using intermittent sheathing for required wall bracing, the integration of structural wall bracing and any required continuous foam insulation should be left to the judgment and experience of the responsible designer and the code official.

RE29-13

Final Action: AS AM AMPC____ D

RE32-13

Table R402.1.1 (IRC Table N1102.1.1)

Proposed Change as Submitted

Proponent: Tom Kositzky, Representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h] or 28	19 / 21	38[g]	15/19	10,4ft	15/19

(*Portions of Table not shown remain unchanged.)***

Reason: The purpose of this code change proposal is to ensure product neutrality with regards to the building code. It is not appropriate for the code to require builders in Climate Zones 7 and 8 to use a specific product type (continuous insulation or insulated siding) to meet the prescriptive requirements when other equitable options are readily available. The 2012 IECC set a prescriptive mandate for the use of continuous insulation in the aforementioned zones. This proposal establishes a cavity-only insulation option of R28 for these climate zones.

The *U*-factor calculation tables below illustrate the performance equivalency between the current prescriptive *R*-values and the proposed cavity insulation-only *R*-value option. Use of the cavity insulation-only option will likely require deeper framing members to accommodate thicker insulation that can reach the minimum level of R28. The *U*-factor calculations assume that the continuous insulation wall assemblies use let-in-bracing to meet the IRC requirements for wall bracing.

Table 1 shows the *U*-factor calculations for a 2x6 framed wall with R20 cavity insulation plus R5 continuous insulation, and for a 2x8 framed wall using R28 cavity insulation with 3/8-inch thick wood panel sheathing (which is the minimum thickness of wood panel bracing allowed in the IRC). Both calculations yield a wall *U*-factor of 0.046.

Table 2 shows the *U*-factor calculation for a 2x4 framed wall with R13 cavity insulation and R10 continuous insulation, and also a calculation for a 2x8 framed wall using R28 cavity insulation with the more common 7/16-inch thick wood structural panel sheathing. The calculations yield *U*-factors of 0.045 and 0.046, respectively.

This proposed code change will provide additional prescriptive options to designers and builders in these two Climate Zones.

We request the committee's support of this proposal.

Table 1. Climate Zones 7-8 Wood Framed Walls
(R20+5 and R28)

Wall Thermal Resistance by Component	R20+5 Wall - (2x6)			Proposed R28 Wall - (2x8)		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	5			0		
Wood Structural Panel Sheathing (3/8”)	0			0.47		
Stud/Cavity Insulation	6.875	20		9.063	28	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	13.85	26.97	**21.80**	11.50	30.44	**21.56**
Total Wall U-Factors	0.072	0.037	**0.0459**	0.087	0.033	**0.0464**

Table 2. Climate Zones 7-8 Wood Framed Walls
(R13+10 and R28)

Wall Thermal Resistance by Component	R13+10 Wall - (2x4)			Proposed R28 Wall (2x8 with 7/16” sheathing)		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	10			0		
Wood Structural Panel Sheathing (7/16”)	0			0.62		
Stud/Cavity Insulation	4.375	13		9.063	28	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	16.35	24.97	**22.06**	11.65	30.59	**21.75**
Total Wall U-Factors	0.061	0.040	**0.0453**	0.086	0.033	**0.0460**

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

R402.1.1T #1-EC-KOSITZKY

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Disapproved in accordance with the proponent’s request. The proponent conceded that the proposals for lessening of stringency based on various payback periods were being consistently disapproved by the committee.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tom Kositzky, Coalition for Fair Energy Codes, requests Approval as Submitted.

Commenter's Reason: This proponent moved for disapproval based on the committee's disapproval of similar proposal to Table R402.1.1. However, there has been widespread reluctance for jurisdictions in these climate zones to adopt the 2012 IECC because cavity insulation only options were not included in the prescriptive path of the code. This modification to the code would offer builders and designers a choice to use a variety of cavity insulation options including thicker wall cavities (such as 2x8) and still use the prescriptive table.

We urge the support of the original code change proposal to include cavity only options in Table 402.1.1.

RE32-13

Final Action: AS AM AMPC____ D

RE33-13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Tom Kositzky, Representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+2~~5~~ or 13+6.5~~10~~[h] or 24	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.048~~ 0.055	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(*Portions of Table not shown remain unchanged)*

Reason Statement: The increase in wood frame wall *R*-value in Climate Zone 6 of Table R402.1.1 of the 2012 IECC was essentially arbitrary and is without basis other than it represents the *R*-value for a readily available, specific type of foam sheathing. The requirements also mandate the use of continuous insulation since no cavity-only insulation option was included in the prescriptive table. Stakeholders around the country in Climate Zone 6 do not consider this level of insulation to be cost effective nor necessary in this climate zone. Due in part to such high insulation requirements, the 2012 IECC is not being adopted consistently in these states.

This proposal offers a compromise by increasing stringency significantly beyond the requirements of the 2009 IECC with more cost effective alternatives. The wall insulation can be met with continuous insulation and cavity insulation options (R20+2 or R13+6.5) or the cavity-only option of R24. This proposal creates much more cost effective provisions that will offer builders more alternatives in meeting the wood frame wall requirements found in Table R402.1.1. More choices will help to gain greater stakeholder buy-in and will enable the 2015 IECC to gain greater acceptance, thereby creating more energy conservation opportunities.

In combination with these changes in Table 402.1.1, we propose a corresponding change to the *U*-factor listed in Table R402.1.3 for wood frame walls. Tables 1 and 2 below provide the *U*-factor calculations for all three of the prescriptive wall alternatives identifying that all of the systems meet the proposed *U*-factor target. The right hand columns of Table 2 show that the same *U*-factor is achieved when the commonly used 7/16-inch wood structural panel sheathing is used rather than the code minimum 3/8-inch sheathing.

We ask the support of the committee for this proposal.

Table 1. - Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R20+2			2x6 Wall - R24		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	2			0		
Wood Structural Panel Sheathing (3/8")	0			0.47		
Stud/Cavity Insulation	6.875	20		6.875	24	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	10.85	23.97	**18.40**	9.32	26.44	**18.11**
Total Wall U-Factors	0.092	0.042	**0.0543**	0.107	0.038	**0.0552**

Table 2. - Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x4 Wall - R13+6.5			2x6 Wall - R24		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	6.5			0		
Wood Structural Panel Sheathing (7/16")	0			0.62		
Stud/Cavity Insulation	4.375	13		6.875	24	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	12.85	21.47	**18.38**	9.47	26.59	**18.31**
Total Wall U-Factors	0.078	0.047	**0.0544**	0.106	0.038	**0.0546**

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

R402.1.1T #2-EC-KOSITZKY

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Disapproved in accordance with the proponent's request. The proponent conceded that the proposals for lessening of stringency based on various payback periods were being consistently disapproved by the committee.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Johnson, Johnson Consulting Services, representing the Coalition for Fair Energy Codes, requests Approval as Submitted.

Commenter's Reason: The proposed modifications to Tables R402.1.1 and R402.1.3 address a major obstacle to the adoption of 2015 IECC as proven by the lack of adoptions of the 2012 IECC, and, where adopted, amendments to the Climate Zone 6 framed wall insulation requirements. (See Code Adoption Status Table).

With this proposal wall insulation requirements in Climate Zone 6 can be met with continuous insulation and cavity insulation options (R20+2 or R13+6.5) or the cavity-only option of R24. This is in keeping with information that CFEC has received from many state and local jurisdictions in Climate Zone 6 demanding a return to the flexibility provided by a cavity-only insulation *option* for wood frame walls.

The prescriptive R-value of 24 increases cavity-only insulation stringency by 20% above the R20 value of the 2009 IECC and by 26% above the 2006 IECC. It is a fair compromise between no increase in energy performance from the 2009 IECC and the inflexible frame wall assembly requirements of the 2012 IECC.

The proposed *U*-factor alternative correlates to the R-values for all assemblies as documented by the calculations in the original RE33 proposal. It also is more stringent than the *U*-factor alternative of the 2009 IECC while relaxing only slightly the 19% increase in stringency of the 2012 IECC over the 2009 IECC value.

States in Climate Zone 6 have reacted to the inflexibility and economic burdens imposed by the 2012 IECC's prescriptive wall insulation requirements by almost universally rejecting adoption of the document as written. DOE has projected California, (2 counties), Minnesota, and Washington to be the only Climate Zone 6 states to adopt the 2012 IECC before the end of 2015 – see Table. Note that California's Title 24 standard is inconsistent with the IECC; Minnesota has announced its intention to amend Table R402.1.1 to permit a cavity-only R-21 wall insulation option in both the Climate Zones 6 and 7 portions of the state – which is less restrictive than this proposal; and, Washington has enacted an emergency rule amending its state energy code and classifying its Climate Zone 6 counties as Climate Zone 5.

The cost of compliance with the 2012 IECC and its lack of envelope design flexibility are obstructing its adoption in colder climate zones. Approving this proposal will help position the 2015 IECC for adoption.

Rejection of the 2012 IECC means that less costly but important energy saving measures like improved air sealing and blower door testing, duct sealing, better performing windows, and higher efficacy lighting sources are not being adopted.

An energy code that is not adopted saves no energy.

Climate Zone 6
Code Adoption Status & Amendments to Residential Frame Wall Insulation Requirements

State	Residential IECC Adoption Status: Current Edition[1]	Residential IECC Adoption Status: Projected by End of 2015[1]	Amendments / Updates / Notes
CA	2012	2012	2013 Title 24 standard's R-values not consistent with 2012 IECC.[2]
CO	2003	2003	Home rule state. Vail CO (CZ 6) – 2012 IECC amended to R20 or R13+5
IA	2009	2009	Currently reviewing 2012 IECC for potential adoption. Amendment process only if decision to adopt is made.
ID	2009	2009	Proposing amended 2012 IECC (R20 or 13+5 and U = 0.057)[3]
ME	2009	Unknown	Legislature defeated bill to return to 2003 IECC. No 2012 adoption started.[4]
MI	2009	2009	2012 residential adoption process just initiated.[5] Amendment process not complete.
MN	2006	2012	State is proposing R-21 minimum cavity only insulation amendment.[6]
MT	2009	2009	2012 IECC review in process, status of amendments unknown.
NH	2009	2009	2009 IECC. No indication of start of 2012 IECC adoption.
ND	No state code	Unknown	Proposed to amend 2012 IRC Chapter 11 to R20 in CZ 6 and R21 in CZ 7[7]
NY	2009	2009	2012 code adoption in process. Amendment process not complete.
PA	2009	2009	No indication of start of 2012 IECC adoption
SD	No state code	Unknown	Home rule. Sioux Falls, SD's largest jurisdiction, amended 2012 IRC to R20.[8]
UT	2006	2009	Legislation amended 2012 IECC to R19.[9]
VT	2009	2009	No indication of start of 2012 IECC adoption.
WA	2012	2012	Effective July 1, 2013 WA amended 2012 IECC to eliminate CZ 6, thereby treating those counties the same as climate zone 5.[10]
WI	2006	2009	Currently R19 in CZ 6 and R21 in CZ 7. No administrative rules proposed to change these requirements. No indication of start of 2012 IECC adoption.[11]
WY	No state code	Unknown	Home rule. Cheyenne, WY's largest jurisdiction uses 2006 IRC, R19.[12]

1. US Department of Energy; http://www.energycodes.gov/status-state-energy-code-adoption (accessed June 21, 2013)
2. http://www.energy.ca.gov/title24/2013standards/index.html
3. http://dbs.idaho.gov/boards/BBboard/SpecInterest/PARF_Bldg_2012_IBC_IRC_IECC_Amendments_June_TEXT.pdf
4. http://www.maine.gov/dps/bbcs/

5. http://www.michigan.gov/lara/0,4601,7-154-35299_10575-300500--,00.html
6. Personal e-mail from State of MN staff dated April 17, 2013
7. http://www.communityservices.nd.gov/uploads/resources/976/2012-international-residential-code-amendments-updates.pdf
8. http://www.siouxfalls.org/~/media/Documents/building/ord-adoption/FINAL_Edited_2012-IRC_Code_Ordinance_with_COMMENTARY.pdf
9. http://le.utah.gov/~2013/bills/hbillenr/HB0202.pdf
10. https://fortress.wa.gov/ga/apps/SBCC/File.ashx?cid=2793 (Accessed July 3, 2013)
11. http://165.189.64.111/Default.aspx?Page=44e541e8-abdd-49da-8fde-046713617e9e (Accessed July 8, 2013)
12. http://library.municode.com/index.aspx?clientId=16266 (Accessed July 8, 2013)

We ask for your support to overturn the committee action and to approve RE33 as submitted.

RE33-13

Final Action: AS AM AMPC____ D

RE34-13

Table R402.1.1 (IRC N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h,i]	8/13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5[h,i]	8/13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h,i]	13/ 7	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20 or 13+5[h,i] ~~20+5 or 13+10[h,i]~~	15/20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20 or 13+5[h,i] ~~20+5 or 13+10[h,i]~~	19/21	38[g]	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

(Portions of Table not shown remain unchanged.).

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.048~~ 0.057	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.048~~ 0.057	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged.).

Reason: The prescriptive wall requirement increased to R-20+R5 in Climate zones 6, 7 and 8 of the 2012 IECC. The additional cost for this is estimated at $1,819 for 1,016 square feet of wall. This makes the simple payback between 26 and 55 years depending on the climate zone. This also will create a negative cash flow for the consumer in all cases.

Climate Zone	Representative City	Basement Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
6	Minneapolis, MN	R-20->R-20+5	$33/yr	$1,819 ($1.79/ft2)	55 years
7	Bemidgi, MN	R-20->R-20+5	$41/yr	$1,819 ($1.79/ft2)	44 years
8	Fairbanks, AK	R-20->R-20+5	$71/yr	$1,819 ($1.79/ft2)	26 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481.

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

R402.1.1T#4-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Disapproved in accordance with the proponent's request. The proponent conceded that the proposals for lessening of stringency based on various payback periods were being consistently disapproved by the committee.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Timothy Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials, request As Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1) INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]	
CLIMATE ZONE	**WOOD FRAME WALL R-VALUE**
6	20+5 or 13+10[h,i] or 21
7 & 8	20+5 or 13+10[h,i] or 21

TABLE R402.1.3 N1102.1.3) EQUIVALENT *U*-FACTORS[a]	
CLIMATE ZONE	**FRAME WALL U-FACTOR**
6	0.057
7 & 8	0.057

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The State of Minnesota is amending the 2012 IECC to permit a 2" by 6" nominal wood framed wall cavity-only insulation option for both CZ 6 and 7. There is little demand for, and considerable opposition to, mandating continuous insulation or deeper insulation cavities than provided by 2" by 6" framing.

R21 was selected as the appropriate performance metric because it does not discriminate against materials. R21 also corresponds with proposed amendments to important neighboring jurisdictions, keeping a level field for cross-border economic competition. Minnesota neighbors include:

- North Dakota, which is proposed to require R20 in CZ 6 and R21 in CZ 7.
- South Dakota; a home rule state with energy codes adopted as local options. Sioux Falls, SD's largest city, is in CZ 6 and a short distance from the MN border. It has elected to amend the 2012 IRC energy provisions to R20.
- Wisconsin, which currently administers R19 in CZ 6 and R21 in CZ 7. As of July 5, 2013 there are no administrative rules proposed to change these requirements on WI's state website nor are there indications of a 2012 IECC adoption initiation.
- Iowa administers R20 in CZ 6. As of July 5, 2013 there are no administrative rules proposed to change these requirements on IA's state website nor are there indications of a 2012 IECC adoption initiation.

We request that the assembly overturn the committee action and approve RE34 as modified by this public comment.

Public Comment 2:

Tim Ryan, The International Association of Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENES-TRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENES-TRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE AND DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h,i]	8/13	19	5/13[f]	0	5/13

4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h,i]	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h,i]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20 or 13+5[h,i]	15/20	30[g]	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	~~20 or 13+5[h,i]~~ 20+5 or 13+10[h,i]	19/21	38[g]	15/19	10, 4 ft	15/19

(All footnotes remain unchanged)

TABLE R402.1.3
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.057	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048~~0.057~~	0.057	0.028	0.050	0.055

(All footnotes remain unchanged)

Commenter's Reason: The prescriptive wall requirement increased to R-20+R5 in Climate zone 6 of the 2012 IECC. The additional cost for this is estimated at $1,819 for 1,016 square feet of wall. According to NAHB, this will result in a simple payback of roughly 55 years and create a negative cash flow for the consumer.

We cannot make new requirements that drastically change the way builders construct homes especially when the calculated payback is so long.

Climate zones 7 and 8 are very cold and the paybacks, although long, are much shorter than climate zone 6. Therefore, this public comment reinstates the 2012 wall R-values in the northernmost climate zones.

RE34-13

Final Action: AS AM AMPC____ D

RE37-13
Table R402.1.1 (IRC Table N1102.1.1)

Proposed Change as Submitted

Proponent: Brenda A. Thompson, Clark County Building Department, Las Vegas NV, representing the ICC Sustainability, Energy & High Performance Code Action Committee (SEHPCAC) (bat@clarkcounty.gov)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE AND DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h]	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h] or 22	15/20	30[g]	15/19	10, 4 ft	15/19
7 ~~and 8~~	0.32	0.55	NR	49	20+5 or 13+10 or 27	15/20	38	15/19	10, 4 ft	15/19
8	0.32	0.55	NR	49	20+7.5 or 32	19/21	38[g]	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.

b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.
e. There are no SHGC requirements in the Marine Zone.
f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.
g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.
i. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The SEHPCAC found discrepancies in the Commercial Energy Code RESIDENTIAL table. The SEHPCAC has proposed a fix to the discrepancy in Table C402.1.1. In an effort to further enhance the Residential Energy Code, the SEHPCAC proposes to include a so-called "Cavity Only" insulation solution in the R Values table. The Task Group assigned to this task looked at using the ASHRAE procedures to calculate an R-value based on the existing table entry of cavity insulation plus continuous insulation (e.g. 20+5 in CZ 6 & 7), and the U-factor entry associated with the respective CZ cell. In addition, the Task Group looked at the Cavity Only requirements for Residential wood frame walls from the Commercial Energy Code. The values shown here are those from the Wood Frame Wall section of the Commercial Energy Code. The SEHPCAC determined that the energy performance of wood frame wall assemblies in a residential use would be effectively similar in either the commercial group or the noncommercial group. Thus the SEHPCAC chose to propose the same values in this table. This proposal also splits climate Zone 8 away from 7 and then plugs in higher R-value into the CZ8 cell for wood frame walls. The rest of the CZ 8 cells simply duplicate the CZ 7 values.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This proposal will increase construction costs in Climate Zone 8 only.

R402.1.1T#1-EC-THOMPSON-SEHPCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proponent requested disapproval based on uncertainty about the supporting data.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda A. Thompson, CBCO, Manager Building Inspections, Clark County Development Services, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (SEHPCAC) Chair, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENES-TRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENES-TRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE AND DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h]	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]or ~~22~~ 24	15/20	30[g]	15/19	10, 4 ft	15/19
7	0.32	0.55	NR	49	20+5 or 13+10[h]or ~~27~~ 28	15/20	38	15/19	10, 4 ft	15/19
8	0.32	0.55	NR	49	20+5 or 13+10[h]or ~~32~~ 28	19/21	38[g]	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

Commenter's Reason: One of SEHPCAC goals of a series of our code changes is to provide in these tables a filled cavity only option for the wood frame walls. The SEHPCAC submitted this change and CE97-13 as part of this effort. CE97 was disapproved, but CE99-13 was approved. It provided cavity only values for climate zones 6 through 8. This public comment incorporates the values approved in CE99 for Grouip R construction and directly copies them for residential construction under the Residential portion of the IECC.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RE37-13

Final Action: AS AM AMPC____ D

RE38-13

Table R402.1.1 (IRC Table N 1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

<u>Proposed Change as Submitted</u>

Proponent: Martha G. VanGeem representing the Masonry Alliance for Codes and Standards (Martha.vangeem@gmail.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25[e]	38	~~20 or 13+5[h]~~ <u>13</u>	~~8/13~~ <u>5 / 8</u>	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	~~0.057~~ 0.082	~~0.098~~ 0.141	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: It is not practical or cost effective to require more than R-13 insulation for wood frame walls in Climate Zone 3. If this value for frame walls is changed back to R13 as in Table 402.1.1 in the 2009 IECC, then the mass wall R-value in Table 402.1.1 should be changed back to the mass wall R-value for Climate Zone 3 in the 2009 IECC. Similarly, the U-factor should be changed back to the mass wall U-factor in Table 402.1.3 of the 2009 IECC. These changes are indicated above.

The equivalency between mass wall and frame wall R-values in Climate Zone 3 was previously demonstrated for previous versions of the IECC. Mass walls have significant energy saving benefits in Climate Zone 3.

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

R402.1.1T-EC-VANGEEM

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Disapproved in accordance with the proponent's request. The proponent conceded that the proposals for lessening of stringency based on various payback periods were being consistently disapproved by the committee.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tom Kositzky, Coalition for Fair Energy Codes, requests Approval as Submitted.

Commenter's Reason: The energy cost savings in this mild climate of going from R13 to R20 walls or from R8/13 to R5/8 mass walls is minimal. With wood frame walls, the annual energy savings of going from R13 to R20 has been estimated to be between $22 and $64 per year, depending on the size and configuration of the house, with an average savings of $42.60. The cost to go from 2x4 to 2x6 construction in a 2,000 square foot, two-story house has been estimated by the National Association of Home Builders to be over $2,930.00. Even if the actual cost is only half that number, or $1,465, it would still take over 34 years for a simple payback on the increased cost of construction. If 4% annual interest is applied to the additional $1,465 of a 30-year mortgage, the energy savings of $42.60 fails to even cover the $59 annual cost of the additional mortgage. So, proposing that wood frame walls be insulated at R13 instead of R20 in Climate Zone 3 hardly represents an extreme roll-back in energy savings; especially considering the added cost of construction.

This proposal does not drastically impact energy savings and will decrease the cost of construction, resulting in more affordable housing for first-time homeowners.

We urge your support of RE38 as submitted.

Public Comment 2:

Martha Van Geem, representing Masonry Alliance for Codes and Standards, requests Approval as Submitted.

Commenter's Reason: This proposal combines RE26, RE35, and RE38 for values in Climate Zone 3. RE26 and RE35 change the wood frame R-value for Climate Zone 3 to R13. R38 changes the mass wall R-value to be consistent with the proposed wood frame R-value.

Public Comment 3:

Tim Ryan, International Association of Building Officials request Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25[e]	38	13	5 / 8	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	~~20 or 13+5[h]~~	~~8/13~~ <u>5/10</u>	19	10 / 13	10, 2 ft	10/13

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
					<u>13</u>					
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.082	0.141	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	~~0.057~~ <u>0.082</u>	~~0.098~~ <u>0.141</u>	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Commenter's Reason: RE38 originally attempted to change the wall R-values in climate zone 3 back to that of the 2009 IECC, this public comment seeks to also include climate zone 4. A number of jurisdictions have chosen to also reduce the wall requirements in both climate zone 3 and climate zone 4. Rather than have this requirement be amended locally, this comment seeks to fix the problem nationally.

RE38-13
Final Action: AS AM AMPC____ D

RE40-13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

<u>Proposed Change as Submitted</u>

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h]	8/13	19	5/13[f]	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5[h]	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h]	13 / 17	30[g]	~~15/19~~ <u>10/13</u>	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5[h]	15 / 20	30[g]	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10[h]	19 / 21	38[g]	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

(Portions of Table not shown remain unchanged.)

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	~~0.050~~ 0.059	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged.)

Reason: The prescriptive basement wall requirement increased from R-10 to R-15 in the 2012 IECC. Calculations used to justify the change were based on energy models which had less sophisticated algorithms than Energy Plus which is now the preferred modeling software of the Department of Energy. When using Energy Plus, the energy savings in a 700 square foot basement totaled $7/yr in Chicago (Climate zone 5). The additional cost for this is conservatively estimated at $590. This makes the simple payback in excess of 58 years. This also will create a negative cash flow for the consumer. The values being modified by this proposal are the same as what was proposed by the Department of Energy in their proposal EC13 from the last cycle. The values currently adopted were an increase from proposals not submitted by the Department of Energy.

Climate Zone	Representative City	Basement Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
5	Chicago, IL	R-10->R-15	$7/yr	$590 ($0.82/ft2)	84 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481

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

R402.1.1T#1-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Disapproved in accordance with the proponent's request. The proponent conceded that the proposals for lessening of stringency based on various payback periods were being consistently disapproved by the committee.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Martha G. VanGeem representing the Masonry Alliance for Codes and Standards requests Approval as Submitted.

Commenter's Reason: The commenter provides cost justification indicating an 84-year simple payback for the insulation levels in the current code: The initial investment is $590 in order to save $7 a year in energy. This is an excessive burden to builders and homeowners. Available money is better spent on other energy-saving measures.

In addition, it does not make sense to have the requirements for basement R-values greater than the requirements for above grade mass walls, which they are in the current code for this climate zone. The basement wall is usually concrete or masonry – a mass wall. In addition, most of the basement wall has earth against it, providing additional insulating and thermal mass benefits. Approving this code change proposal will rectify this contradiction in the code.

RE40-13
Final Action: AS AM AMPC____ D

RE44-13
Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	~~0.057~~ 0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	~~0.057~~ 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to correct the assumptions behind the wood-frame wall U-factors embedded in Table R402.1.3 of the IECC. The misrepresent the true performance of homes and, as such, over-estimate the energy efficiency of a typical R13 wood wall assembly when the Total UA or Simulated Performance path is used to demonstrate compliance to the IECC.

The wood wall U-factor values in Table R402.1.3 are currently based on a wall system that assumes the use of 5/8" plywood sheathing, which is well in excess of the minimum (3/8" thick) structural wood panel wall bracing in the International Residential Code (IRC). The U-factor value for the R13+5 wood wall system also assumes that a full double layer of 5/8" plywood sheathing and 1" continuous insulation is used. Neither the use of 5/8" structural panel wall sheathing or double sheathing with structural panels and continuous insulation in single family houses is commonly practiced or required by code.

According to the NAHB Research Center's 2011 Builders Survey, 5/8" or thicker wood structural panel wall sheathing makes up only 10% of the structural wood wall sheathing used in single-family residential construction. While 68% of residential single family wall area used wood structural panel sheathing was 7/16" thick or less.

There are several code options for braced wall segments that can incorporate continuous insulation over the top without adding a layer of structural wood panels. There are also options to use structural panels in combination with continuous insulation in between the structural segments. The code must be based on minimum systems that meet the provisions of the code in order to establish requirements that are fair to all products and assemblies. That minimum system would be a single layer of sheathing using continuous insulation.

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

R402.1.3T #1-EC-ELLIS

Committee Action Hearing Results

Errata: The proposal only intends a change to Zones 3 and 4 in the Frame Wall U-Factor column.

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal bring transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 3-4 wood frame wall *U*-factors in Table R402.1.3.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of RE44. Proposals RE44, RE45, RE46, RE47 and RE50 should be disapproved because they weaken the energy efficiency requirements of the IECC's U-factor, Total UA, and Simulated Performance alternatives. These proposals all suffer from the same fatal flaw – they treat the U-factor table (R402.1.3) as a direct product of the prescriptive table (R402.1.1), and attempt to align the two tables based on a single method of construction. The result is an unnecessary weakening of the stringency of the IECC and constitutes backsliding from the 2012 IECC:

- The foundation of the IECC residential envelope requirements is Table R402.1.3, which sets the baseline for efficiency in residential buildings. The U-factor alternative (R402.1.3), the Total UA alternative (R402.1.4), and the Simulated Performance alternative (R405) all reference Table R402.1.3 for the efficiency baseline for specific assemblies. These compliance options are designed to allow maximum flexibility as long as a specified baseline level of efficiency is achieved.
- The simple prescriptive path (Table R402.1.1) is a popular compliance option, but it is only one means of achieving compliance with Chapter 4 of the residential IECC. The simple prescriptive path (Table R402.1.1 and accompanying sections) is a simplified, component-based "recipe" for meeting the code, but it was never intended to be the starting point for all compliance paths or to exactly equal Table R402.1.3, any more than a home built to other aspects of the prescriptive path would exactly match a home built under Table R402.1.3. Unlike the baseline in Table R402.1.3, prescriptive requirements are based on commonly available building products, but any builder that seeks greater flexibility must use one of the other compliance alternatives.
- It is not possible to make the R-value and U-factor tables exactly consistent with one another in all cases because a comparative analysis must be based on a range of assumptions such as framing fractions and other assembly details that are not currently specified in the IECC. These details will also vary from building to building and may differ across the various climate zones. The proponent of RE44 admits as much in the reason statement, claiming that "68% of residential single family wall area used wood structural panel sheathing was 7/16" thick or less." This raises a multitude of questions:
    - Would RE44 and similar proposals thus make 32% of "residential single family wall area" inconsistent with the U-factor tables?
    - Were there climate-specific variations in both the usage of structural sheathing and the thickness of sheathing? If so, why is the same calculation used for every climate zone?
    - What about multifamily buildings, townhomes, condos, and other residential buildings covered by the residential requirements of the IECC? Were these buildings even modeled?

Perhaps the most telling statement in RE44 is at the bottom of the reason statement: "The code must be based on minimum systems that meet the provisions of the code in order to establish requirements that are fair to all products and assemblies." In other words, the proponent believes that the code must be based on the least-efficient assembly possible under the R-value table. To essentially rewrite the three U-factor based compliance paths based on a single worst-case application of the prescriptive R-value approach is simply backwards. RE44-47 and RE50 would significantly weaken the requirements of the IECC, and each of these proposals should be disapproved.

RE44-13

Final Action: AS AM AMPC____ D

RE45-13
Table R402.1.3 (IRC N1102.1.3)

Proposed Change as Submitted

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.082~~ <u>0.084</u>	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.082~~ <u>0.084</u>	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to correct the assumptions behind the wood-frame wall U-factors embedded in Table R402.1.3 of the IECC. The misrepresent the true performance of homes and, as such, over-estimate the energy efficiency of a typical R13 wood wall assembly when the Total UA or Simulated Performance path is used to demonstrate compliance to the IECC.

The wood wall U-factor values in Table R402.1.3 are currently based on a wall system that assumes the use of 5/8" plywood sheathing, which is well in excess of the minimum (3/8" thick) structural wood panel wall bracing in the International Residential Code (IRC).

While 3/8" is the minimum wood structural panel wall bracing thickness allowed in the IRC, the most common structural panel thickness used in the United States is 7/16-inch. According to the 2011 Builders Survey, 68% of residential single family wall area used wood structural panel sheathing that was 7/16" thick or less. Therefore, it is reasonable to use an R-value for structural wood panels of 0.62R in the calculation for the U-value for climate zones 1 and 2. According to Table 2, that U-factor is 0.084.

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

R402.1.3T #2-EC-ELLIS

Committee Action Hearing Results

Errata: The proposal only intends a change to Zones 1 and 2 in the Frame Wall U-Factor column.

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal brings transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 1 and 2 wood frame wall *U*-factors in Table R402.1.3.

Assembly Action: **None**

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tom Kositzky, representing the Coalition for Fair Energy Codes, requests As Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.3
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.084~~ <u>0.085</u>	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.084~~ <u>0.085</u>	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remains unchanged)

Commenter's Reason: The committee chose to approve RE45-13 which set the U-factors for Climate Zones 1 and 2 at U-0.084 which we agree is more correct than the U-0.082 factor in the 2012 IECC. While the assembly assumption in RE45 are very close, accepting the 0.084 U-factor sets a precedent that the U-factors can be established without using the code minimum wood structural panel wall bracing in the frame wall system assumptions. The 0.084 U-factor assumes that the wood sheathing is 7/16 inches. The code minimum wood structural panel sheathing thickness for wall bracing is 3/8 inches.

Therefore, the base calculations should use the R-value for 3/8" thick wood structural panels in the evaluation. When the calculation is done with the correct sheathing R-value, the calculated U-factor is U-0.085. This is the U-factor that should be used.

We urge the support of this code change proposal as modified by this public comment.

Wall Thermal Resistance by Component	5/8" Wood Sheathing			7/16" Wood Sheathing			3/8" Wood Sheathing		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Wall - Outside Winter Air Film	0.25			0.25			0.25		
Siding - Plywood	0.59			0.59			0.59		
Continuous Insulation	0			0			0		
Wood Structural Panel Sheathing	0.83		(5/8")	0.62		(7/16")	0.47		(3/8")
Stud/Cavity Insulation	4.375	13		4.375	13		4.375	13	
1/2" Drywall	0.45			0.45			0.45		
Inside Air Film	0.68			0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%		25%	75%	
Total Wall R-Values	7.18	15.80	**12.15**	6.97	15.59	**11.90**	6.82	15.44	**11.73**
Total Wall U-Factors	0.139	0.063	**0.0823**	0.144	0.064	**0.0840**	0.147	0.065	**0.0853**

Public Comment 2:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of RE45 for the same reason as RE44. Proposals RE44-47 and RE50 should all be disapproved because they collectively weaken the energy efficiency requirements of the IECC's U-factor, Total UA, and Simulated Performance alternatives. These proposals all suffer from the same fatal flaw – they treat the U-factor table (R402.1.3) as a direct product of the prescriptive table (R402.1.1), and attempt to align the two tables based on a single method of construction. The result is an unnecessary weakening of the stringency of the IECC and constitutes backsliding from the 2012 IECC.

RE45-13
Final Action: AS AM AMPC____ D

RE46-13
Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Tom Kositzky, representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	~~0.057~~ <u>0.060</u>	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	~~0.057~~ <u>0.060</u>	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	~~0.057~~ <u>0.060</u>	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to bring transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 3-5 wood frame wall *U*-factors in Table R402.1.3. The *REScheck*™ assumptions result in *U*-factors that misrepresent the true energy performance of wood walls and, as such, over-estimate the energy efficiency of a typical R20 and R13+5 wood wall assemblies when the assembly *U*-factor, Total UA alternative or Simulated Performance alternative is used to demonstrate compliance.

This proposal corrects two *REScheck*™ assumptions which were used to generate the wood wall *U*-factors in Table R402.1.3.

1. It was assumed that 5/8-inch plywood wall sheathing is used.
   (This assumption is in excess of the minimum required, 3/8-inch thick, wood structural panel wall bracing that is required in the IRC.)
2. The assumption that a double layer of wall sheathing is used for R13+5 assemblies.
   (A layer of R5 continuous insulation with an additional layer of continuous 5/8-inch plywood wall sheathing is assumed.)

Both of these assumptions are not based upon common practice nor are they required by the IRC. In order to establish baseline requirements that are fair to all products and systems, the code should be based upon the minimum performing assemblies that meet the provisions of the code. The minimum performing system in IECC Table R402.1.1 is found in footnote h. It allows continuous insulating sheathing to be used in combination with intermittent structural wall bracing (a.k.a., corner bracing) and results in a *U*-factor of 0.064 as shown below in Table 3.

Recognizing the strong opposition regarding the use of this common prescriptive wall assembly (footnote h) as a basis for generating *U*-factors, we propose basing the Climate Zone 3-5 continuous insulating sheathing *U*-factor on an assembly that uses let-in-bracing (per IRC Table R602.10.4) or metal strap bracing to provide lateral support. The resulting *U*-factor of 0.060 correlates to the *U*-factor for an R20 wall when code minimum 3/8-inch wood structural panel sheathing is used in lieu of 5/8-inch plywood. (See Table 2 below.)

A *U*-factor of 0.060 aligns more closely with common construction practices and would be a more reasonable value for wood frame walls in Climate Zones 3-5.

We ask the support of the committee for this proposal.

Table 1 shows the RES*check*™ component assumptions which were used to determine the prescriptive *U*-factors in Table R402.1.3 of the IECC[1, 2]. The cells representing the 5/8-inch plywood and double layer wall sheathing assumptions are shaded.

Table 2 shows the component assumptions for the *U*-factor being proposed.

Table 3 represents a code-compliant and common construction approach which is provided for reference.

Table 1. U-Factor Calculations for Climate Zones 3-5, Wood Framed Walls (Current U-Factor Basis)

Wall Thermal Resistance by Component	2x4 Wall - R13+5			2x6 Wall - R20		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	5			0		
Wood Structural Panel Sheathing (5/8")	0.83			0.83		
Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	12.18	20.80	**17.67**	9.68	22.80	**17.03**
Total Wall U-Factors	0.082	0.048	**0.0566**	0.103	0.044	**0.0587**

Table 2. U-Factor Calculations for Climate Zones 3-5, Wood Framed Walls (Common Basis)

Wall Thermal Resistance by Component	2x4 Wall - R13+5 Corrected			2x6 Wall - R20 Corrected		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	5			0		
Wood Structural Panel Sheathing (3/8")	0			0.47		
Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	11.35	19.97	**16.78**	9.32	22.44	**16.59**
Total Wall U-Factors	0.088	0.050	**0.0596**	0.107	0.045	**0.0603**

Table 3. U-Factor Calculations for Climate Zones 3-5, 2x4 Wood Framed Walls (Using Table 402.1.1, Footnote h as Basis)

Wall Thermal Resistance by Component	2x4 Wall - R13+5 (60 percent of wall area with specified continuous insulation level and no structural bracing)			2x4 Wall - R13+5 (40 percent of wall area with reduced continuous insulation level + structural sheathing)			Total Assembly Value
	R-Value Studs	**R-Value Cavity**	**60% of wall area**	**R-Value Studs**	**R-Value Cavity**	**40% of wall area**	
Outside Air Film	0.25			0.25			
Siding	0.59			0.59			
Continuous Insulation	5			2			
Intermittent Structural Wall Bracing (3/8")	0			0.47			
Stud/Cavity Insulation	4.375	13		4.375	13		
1/2" Drywall	0.45			0.45			
Inside Air Film	0.68			0.68			
Studs at 16" o.c.	25%	75%		25%	75%		
Total Wall R-Values	11.35	19.97	**16.78**	8.82	17.44	**14.01**	**15.6733**
Total Wall U-Factors	0.088	0.050	**0.0596**	0.113	0.057	**0.0714**	**0.0638**

References:
[1]U.S. Department of Energy, Washington D.C. 2011 Methodology for Developing the RES*check*™ Software through Version 4.4.3. http://www.energycodes.gov/methodology-developing-rescheck-software-through-version-443

[2]See ICC-ES, ESR-2586, Table 4. www.apawood.org/docs/2013/ICC_ESR_2586.pdf

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

R402.1.3T #1-EC-KOSITZKY

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal brings transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 3-5 wood frame wall *U*-factors in Table R402.1.3.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of RE46. We recommend disapproval of RE46 for the same reason as RE44. Proposals RE44-47 and RE50 should all be disapproved because they collectively weaken the energy efficiency requirements of the IECC's U-factor, Total UA, and Simulated Performance alternatives. These proposals all suffer from the same fatal flaw – they treat the U-factor table (R402.1.3) as a direct product of the prescriptive table (R402.1.1), and attempt to align the two tables based on a single method of construction. The result is an unnecessary weakening of the stringency of the IECC and constitutes backsliding from the 2012 IECC.

RE46-13

Final Action: AS AM AMPC____ D

RE47-13
Table R402.1.3 (IRC N1102.1.3)

<u>Proposed Change as Submitted</u>

Proponent: Tom Kositzky, representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.048~~ <u>0.046</u>	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.048~~ <u>0.046</u>	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change proposal is to bring transparency and accuracy to the code by correcting the wood-frame wall *U*-factors for Climate Zones 6, 7 and 8 in Table R402.1.3. The previous assembly component assumptions resulted in *U*-factors that misrepresent the true energy performance of wood walls and, as such, underestimate the energy efficiency of a typical R20+5 wood wall assembly. Correcting the *U*-factor to 0.046 from 0.048 is more consistent with common construction practices for the corresponding assemblies listed in Table 402.1.1.[1]

Table 402.1.1 lists two prescriptive wood wall assembly options for Climate Zones 6-8, both of which require continuous insulation. In addition to meeting the IECC, these walls must also provide lateral resistance for the house which is typically provided through prescriptive wall bracing or shear walls. There are several structural wall bracing options in Table R602.10.4 of the IRC, two of which are commonly used with continuous insulating sheathing:

1. Let-in-bracing (LIB), and;
2. Intermittent structural sheathing (combined with insulating sheathing installed between the structural sheathing, and a thinner insulating sheathing or insulated siding on top of the structural sheathing, per IECC Table R402.1.1, footnote h).

In order to establish baseline requirements that treat all building products and systems equally, the code should be based on the minimum performing assemblies that meet the provisions of the code. The minimum performing system in IECC Table R402.1.1 is continuous insulating sheathing used in combination with intermittent structural wall bracing (footnote h), which results in a *U*-factor of 0.048 as demonstrated in Tables 2 and 3, below. Recognizing that there is opposition to using footnote h as a baseline assembly, we propose basing the *U*-factors for Climate Zones 6-8 on the continuous insulating sheathing wall assemblies that use let-in-bracing that requires no structural sheathing. This proposal results in a *U*-factor of 0.046, which both assemblies are shown to meet, per Table 1.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations for Climate Zones 6-8 Wood Framed Walls

Wall Thermal Resistance by Component	2x4 Wall - R13+10			2x6 Wall - R20+5		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	10			5		
Wood Structural Panel Sheathing	0			0		
Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	16.35	24.97	**22.06**	13.85	26.97	**21.80**
Total Wall U-Factors	0.061	0.040	**0.0453**	0.072	0.037	**0.0459**

Table 2. U-Factor Calculations for Climate Zone 6-8, 2x6 Wood Framed Wall
(Using Table 402.1.1, Footnote h as Basis)

Wall Thermal Resistance by Component	2x6 Wall - R20+5 (60 percent of wall area with specified continuous insulation level and no structural bracing)			2x6 Wall - R20+5 (40 percent of wall area with reduced continuous insulation level + structural sheathing)			Total Assembly Value
	R-Value Studs	R-Value Cavity	60% of wall area	R-Value Studs	R-Value Cavity	40% of wall area	
Outside Air Film	0.25			0.25			
Siding	0.59			0.59			
Continuous Insulation	5			2			
Intermittent Structural Wall Bracing (3/8")	0			0.47			
Stud/Cavity Insulation	6.875	20		6.875	20		
1/2" Drywall	0.45			0.45			
Inside Air Film	0.68			0.68			
Studs at 16" o.c.	25%	75%		25%	75%		
Total Wall R-Values	13.85	26.97	**21.80**	11.32	24.44	**18.95**	**20.66**
Total Wall U-Factors	0.072	0.037	**0.0459**	0.087	0.041	**0.0528**	**0.0484**

Table 3. U-Factor Calculations for Climate Zone 6-8, 2x4 Wood Framed Walls (Using Table 402.1.1, Footnote h as Basis)

Wall Thermal Resistance by Component	2x4 Wall - R13+10 (60 percent of wall area with specified continuous insulation level and no structural bracing)			2x4 Wall - R13+10 (40 percent of wall area with reduced continuous insulation level + structural sheathing)			Total Assembly Value
	R-Value Studs	**R-Value Cavity**	**60% of wall area**	**R-Value Studs**	**R-Value Cavity**	**40% of wall area**	
Outside Air Film	0.25			0.25			
Siding	0.59			0.59			
Continuous Insulation	10			7			
Intermittent Structural Wall Bracing (3/8")	0			0.47			
Stud/Cavity Insulation	4.375	13		4.375	13		
1/2" Drywall	0.45			0.45			
Inside Air Film	0.68			0.68			
Studs at 16" o.c.	25%	75%		25%	75%		
Total Wall R-Values	16.35	24.97	**22.06**	13.82	22.44	**19.41**	**21.0001**
Total Wall U-Factors	0.061	0.040	**0.0453**	0.072	0.045	**0.0515**	**0.0476**

References:[1] See ICC-ES, ESR-2586, Table 4. www.apawood.org/docs/2013/ICC_ESR_2586.pdf

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

R402.1.3T #2-EC-KOSITZKY

Committee Action Hearing Results

Errata: The proposal only intends a change to Zones 6, 7 and 8 in the Frame Wall U-Factor column.

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal brings transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 6, 7 and 8 wood frame wall *U*-factors in Table R402.1.3.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of RE47. We recommend disapproval of RE47 for the same reason as RE44. Proposals RE44-47 and RE50 should all be disapproved because they collectively weaken the energy efficiency requirements of the IECC's U-factor, Total UA, and Simulated Performance alternatives. These proposals all suffer from the same fatal flaw – they treat the U-factor table (R402.1.3) as a direct product of the prescriptive table (R402.1.1), and attempt to align the two tables based on a single method of construction. The result is an unnecessary weakening of the stringency of the IECC and constitutes backsliding from the 2012 IECC.

RE47-13
Final Action: AS AM AMPC____ D

RE48-13
Table R402.1.3 (IRC N1102.1.3)

Proposed Change as Submitted

Proponent: Tom Kositzky, representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.082~~ <u>0.085</u>	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.082~~ <u>0.085</u>	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to bring transparency and accuracy to the code by using more realistic assumptions to generate the Climate Zone 1 and 2 wood-frame wall *U*-factors in Table R402.1.3. The previous assumptions resulted in *U*-factors that misrepresent the true energy performance of wood walls and, as such, overestimate the energy efficiency of a typical R13 wood wall assembly when the assembly *U*-factor alternative, the total UA alternative or Simulated Performance alternative is used to demonstrate compliance. The wood wall *U*-factors in Table R402.1.3 are currently based on an assembly that assumes the use of 5/8-inch plywood sheathing, which is well in excess of the minimum 3/8-inch thick structural wood panel wall bracing in the IRC.

Table 1 incorporates the RES*check*™ assumptions which were used to determine the prescriptive *U*-factors in Table R402.1.3 of the IECC[1,2] in the left hand columns of the table. This base calculation assumes that 5/8-inch thick plywood is used as the sheathing material, resulting in the current 0.082 *U*-factor. The proposed component *R*-value basis in the right-hand columns in Table 1 uses the same RES*check*™ assumptions but incorporates the *R*-value for 3/8-inch wood structural panel sheathing, resulting in a *U*-factor of 0.085.

Adjusting the Climate Zone 1-2 *U*-factors in Table R402.1.3 to 0.085 will more accurately reflect the energy efficiency of an R13 wood wall assembly when the Total UA or Simulated Performance alternatives are used to demonstrate compliance.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations for Climate Zones 1-2 Wood Framed Walls

Wall Thermal Resistance by Component	Current Component R-Value Basis			Proposed Component R-Value Basis		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	0			0		
Wood Structural Panel Sheathing	0.83		(5/8")	0.47		(3/8")
Stud/Cavity Insulation	4.38	13		4.38	13	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	7.18	15.80	**12.15**	6.82	15.44	**11.73**
Total Wall U-Factors	0.139	0.063	**0.0823**	0.147	0.065	**0.0853**

References:
[1]U.S. Department of Energy, Washington D.C. 2011 Methodology for Developing the RES*check*™ Software through Version 4.4.3. http://www.energycodes.gov/methodology-developing-rescheck-software-through-version-443

[2]See ICC-ES, ESR-2586, Table 4. www.apawood.org/docs/2013/ICC_ESR_2586.pdf

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

R402.1.3T #3-EC-KOSITZKY

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed changes would be inconsistent with the changes approved in RE45-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tom Kositzky, representing Coalition for Fair Energy Codes, requests Approval as Submitted.

Commenter's Reason: The committee chose to approve RE45-13 which set the U-factors for Climate Zones 1 and 2 at U-0.084, which we agree is more correct than the 0.082 U-factor in the 2012 IECC. While the assembly assumptions in RE45 are very close, accepting the 0.084 U-factor sets a precedent that the U-factors can be established without using the code minimum wood structural panel wall bracing in the frame wall system assumptions. The 0.084 U-factor assumes that the wood sheathing is 7/16 inches. The code minimum wood structural panel sheathing thickness for wall bracing is 3/8 inches.

Therefore, the base calculations should use the R-value for 3/8" thick wood structural panels in the evaluation. When the calculation is done with the correct sheathing R-value, the calculated U-factor is U-0.085. This is the U-factor that should be used.

We urge the support of RE48 as submitted.

Table 1. U-Factor Calculations for Climate Zones 1-2 Wood Framed Walls

Wall Thermal Resistance by Component	Current Component R-Value Basis			Proposed Component R-Value Basis		
	R-Value Studs	**R-Value Cavity**	**Assembly Value**	**R-Value Studs**	**R-Value Cavity**	**Assembly Value**
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	0			0		
Wood Structural Panel Sheathing	0.83		(5/8")	0.47		(3/8")
Stud/Cavity Insulation	4.38	13		4.38	13	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	7.18	15.80	**12.15**	6.82	15.44	**11.73**
Total Wall U-Factors	0.139	0.063	**0.0823**	0.147	0.065	**0.0853**

RE48-13

Final Action: AS AM AMPC____ D

RE50-13

Table R402.1.3 (IRC Table N1102.1.3)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.082~~ <u>0.084</u>	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.082~~ <u>0.084</u>	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	~~0.057~~ <u>0.060</u>	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	~~0.057~~ <u>0.060</u>	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	~~0.057~~ <u>0.060</u>	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.048~~ <u>0.045</u>	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.048~~ <u>0.045</u>	0.057	0.028	0.050	0.055

(Portions of table not shown remain unchanged)

Reason: The intent of these changes is not to alter the stringency of the code, but rectify the conversion from R-Value to U-Factor. Currently the R-Values and equivalent U-Factors do not match when applying a consistent calculation method.

It is important that the U-Factors and R-Values do match when small alterations are being made to the wall assemblies selected in the R-Value table. For example, a builder does not want to install R-20 as suggested in the R-Value table. Instead, the builder's preferred wall is R-15+R3.8c.i. Although the R-15+R3.8c.i. wall is thermally better than the R-20 wall, it does not meet the requirements of the Equivalent U-Factor table.

Below are a series of calculations which justify the proposed changes to the Frame Wall U-Factor values:

Climate Zone 1 and 2 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13 Batt R-Value Studs	R-Value Cavity	Assembly Value
Wall - Outside Winter Air Film[A]	0.17		
Siding - Vinyl[A]	0.62		
Continuous Insulation	0		
OSB - 7/16"[A]	0.62		
SPF Stud/Cavity Insulation	4.375	13	
1/2" Drywall [A]	0.45		
Inside Air Film[A]	0.68		
Studs at 16" o.c. [A]	25%	75%	
Total Wall R-Values	6.92	15.54	**11.85**
Total Wall U-Values	0.145	0.064	**0.084**
[A]2009 ASHRAE Handbook of Fundamentals			

Climate Zones 3-5 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13+R5			2x6 Wall R-20		
	R-Value Studs	R-Value Cavity	Assembly U-Factor	R-Value Studs	R-Value Cavity	Assembly U-Factor
Wall - Outside Winter Air Film[A]	0.17			0.17		
Siding - Vinyl[A]	0.62			0.62		
Continuous Insulation	5			0		
OSB - 7/16"[A]	0.62			0.62		
SPF Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall [A]	0.45			0.45		
Inside Air Film[A]	0.68			0.68		
Studs at 16" o.c. [A]	25%	75%		25%	75%	
Total Wall R-Values	11.92	20.54	**17.39**	9.42	22.54	**16.71**
Total Wall U-Factor	0.084	0.049	**0.057**	0.106	0.044	**0.060**
[A]2009 ASHRAE Handbook of Fundamentals						

Climate Zones 6-8 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13+R-10 c.i.			2x6 Wall R-20+R-5 c.i.		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Wall - Outside Winter Air Film[A]	0.17			0.17		
Siding - Vinyl[A]	0.62			0.62		
Continuous Insulation	10			5		
OSB - 7/16"[A]	0.62			0.62		
SPF Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall [A]	0.45			0.45		
Inside Air Film[A]	0.68			0.68		
Studs at 16" o.c. [A]	25%	75%		25%	75%	
Total Wall R-Values	16.92	25.54	**22.65**	14.42	27.54	**22.43**
Total Wall U-Values	0.059	0.039	**0.044**	0.069	0.036	**0.045**
[A]2009 ASHRAE Handbook of Fundamentals						

Referenced Standards: None

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

R402.1.3T-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides a consistent, comprehensive code change for frame wall U-Factors for all climate zones. The values are consistent with previous actions (RE44-RE47).

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tom Kositzky, representing the Coalition for Fair Energy Codes, requests As Modified by this Public Comment

Modify the proposal as follows:

TABLE R402.1.3
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.084~~ 0.085	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.084~~ 0.085	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.045~~ 0.046	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.045~~ 0.046	0.057	0.028	0.050	0.055

All table footnotes remain unchanged

Commenter's Reason: The Committee passed two proposals with differing U-factors in Climate Zones 6-8 (RE47 and RE50). While both proposals make similar corrections to the flawed assumptions behind the 2012 IECC U-factors, there is still a small difference between the two proposals that must be decided. The difference is important as the approach to determining U-factors in the code must have a sound basis. This public comment corrects the proposed U-factor as the calculations in RE50 assumed that two layers of continuous sheathing are used on the walls – a layer of continuous insulation and a separate layer of 7/16" wood structural panel sheathing. Instead of a double sheathing layer, this public comment assumes the use of let-in bracing under foam sheathing.

Continuous wood structural panels are not required by code in frame wall systems. Other types of wall bracing can be used that provide no additional R-value to the wall, such as let-in-bracing or a structural continuous insulated sheathing product. Assuming that only let-in bracing is used in a R20+5 wall, the U-factor should be U-0.046.

Even if the frame wall U-factor is calculated with an additional code minimum 3/8" wood structural panel layer under the foam sheathing the U-factor would not change. In both cases using the code minimum bracing requirements, the U-factor for wood framed walls incorporating an R20 cavity insulation and R5 continuous insulation equals U-0.046.

We support the approval of RE-47 which changes the U-factors in Climate Zones 6-8 to U-0.046. This public comment would bring the Climate Zone 6-8 U-factors into alignment with RE-47, the other proposal that the Committee passed. It also corrects the Climate Zone 1-2 U-factors so that they are also based on code minimum 3/8" wood structural panel bracing and not 7/16" wood structural panels.

We urge the approval of this proposal as modified by this public comment.

U-Factor Calculations – Climate Zoness 1-2 Wood Framed Walls

Wall Thermal Resistance by Component	5/8" Wood Sheathing			7/16" Wood Sheathing			3/8" Wood Sheathing		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Wall - Outside Winter Air Film	0.25			0.25			0.25		
Siding - Plywood	0.59			0.59			0.59		
Continuous Insulation	0			0			0		
Wood Structural Panel Sheathing	0.83		(5/8")	0.62		(7/16")	0.47		(3/8")
Stud/Cavity Insulation	4.375	13		4.375	13		4.375	13	

1/2" Drywall	0.45			0.45			0.45		
Inside Air Film	0.68			0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%		25%	75%	
Total Wall R-Values	7.18	15.80	**12.15**	6.97	15.59	**11.90**	6.82	15.44	**11.73**
Total Wall U-Factors	0.139	0.063	**0.0823**	0.144	0.064	**0.0840**	0.147	0.065	**0.0853**

Public Comment 2:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of RE50. We recommend disapproval of RE50 for the same reason as RE44. Proposals RE44-47 and RE50 should all be disapproved because they collectively weaken the energy efficiency requirements of the IECC's U-factor, Total UA, and Simulated Performance alternatives. These proposals all suffer from the same fatal flaw – they treat the U-factor table (R402.1.3) as a direct product of the prescriptive table (R402.1.1), and attempt to align the two tables based on a single method of construction. The result is an unnecessary weakening of the stringency of the IECC and constitutes backsliding from the 2012 IECC.

RE50-13

Final Action: AS AM AMPC____ D

RE52-13
R402.2.1 (IRC N1102.2.1), R402.2.2 (IRC N1102.2.2)

Proposed Change as Submitted

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

R402.2.1 (N1102.2.1) Ceilings with attic spaces. ~~When Section R402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever~~ <u>Where</u> the full height ~~of uncompressed R-30 insulation extends~~ over the wall top plate at the eaves <u>does not allow sufficient space for the required insulation in Section R402.1.1,</u>~~. Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and~~ the total UA alternative in Section R402.1.4 <u>shall be used</u>.

R402.2.2 (N1102.2.2) Ceilings without attic spaces. Where ~~Section R402.1.1 would require insulation levels above R-30 and~~ the design of the roof/ceiling assembly does not allow sufficient space for the required insulation <u>in Section R402.1.1</u>, ~~the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section R402.1.1 shall be limited to 500 square feet (46 m2) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and~~ the total UA alternative in Section R402.1.4 <u>shall be used</u>.

Reason: The purpose of this code change is to improve the efficiency of buildings by removing exceptions to the prescriptive ceiling R-value requirements. The 2012 IECC carves out an exception to the ceiling R-value requirements (in Section R402.2.1 for ceilings with attic spaces and Section R402.2.2 for ceilings without attic spaces) for cases (where there is insufficient space in the ceiling design to install the full amount of required insulation. Although this exception reduces the efficiency of ceilings, there is no corresponding increase of efficiency elsewhere in the building.

The proposal above eliminates the exception in each section because it is unnecessary. Where ceiling space is inadequate to install sufficient insulation, the builder or design professional using the prescriptive approach should use the Total UA analysis (or may opt for the Simulated Performance Alternative) to make up for the efficiency loss elsewhere in the thermal envelope or overall performance of the building. There is no valid reason to continue to give a free pass to buildings designed with insufficient space for adequate ceiling insulation.

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

R402.2.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal would require a Total UA calculation for the building to deal with this situation for attic insulation. This approach is too severe for this situation.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of RE52 as submitted. RE52 improves building energy efficiency by eliminating an unnecessary loophole. The IECC prescriptive path currently allows a significant reduction in ceiling insulation R-value where a raised heel truss is used. The problem with the exception is that it applies in *every situation* where the full, uncompressed height of the insulation extends over the wall plate at the eaves. Even in buildings where R-38 could easily be installed (and would improve energy efficiency of the building for 100 years), the exception automatically kicks in. We view this as an overly broad and unnecessary loophole that gives away long-term energy efficiency and cost savings for homeowners.

RE52 eliminates the loophole, while providing considerable flexibility to meet the insulation requirement. It would not "require a Total UA calculation" in every case, as suggested by the committee reason statement. Rather, it would require the correct amount of insulation where there is room for it, and a simple UA calculation, REScheck calculation, or performance calculation could be used if the roof design does not give enough space for the full insulation height.

RE52-13

Final Action: AS AM AMPC____ D

RE54-13
R402.2.1 (IRC N1102.2.1)

Proposed Change as Submitted

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R402.2.1 (N1102.2.1) Ceilings with attic spaces. When Section R402.1.1 would require R-38 in the ceiling, <u>it is required to be continuous across the entire attic at a depth sufficient to achieve an R-38.</u> R-30 shall <u>only</u> be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves <u>and the remainder or the attic continues to be R-38.</u> Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves <u>and the remainder or the attic continues to be R-49</u>. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Reason: The language of this section has been misinterpreted for years to mean exactly what is being stated in the change. The language change makes it clear that continuous depth of insulation is required across the entire attic to the level that is called out in section R402.1.1. The only exception is over the top plate where insulation depth can be reduced due to the slop of the roof. Efficiency of the home is increased and if a reduction of the R-value is necessary for other building reasons then the other alternative compliance paths are available so tradeoffs can be utilized and code compliance can be achieved.

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

R402.2.1-EC-SCHWARZ

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this in preference to the language and approach in RE53-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.1 Ceilings with attic spaces. ~~When~~ <u>Where</u> Section R402.1.1 ~~would~~ require<u>s</u> R-38 in the ceiling, ~~it is required to be continuous across the entire attic at a depth sufficient to achieve an R-38.~~ <u>the insulation shall be installed to maintain a continuous depth and R-value across the entire attic.</u> R-30 shall only be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves ~~and the remainder or the attic continues to be R-38.~~ Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves ~~and the remainder or the attic continues to be R-49~~. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Commenter's Reason: The language clarifies that this section is not an alternative but rather an exception to the code. The code calls out a specific R-value per climate zone in table R402.1.1. It does not call out a lower allowable R-value. This section R402.2.1 allows for an exception in a particular common attic configuration, over the top plate, where full height insulation often can not be installed. The area over the top plate that would have the reduced R-value constitutes approximately 10-20% of the total area of a typical attic (depending on how it is calculated) and degrades the R-value of the entire attic less than moving to R-30 across the entire attic.

Weighted R-value Example: 1000 SQFT Attic
800 SQFT R-38 / 200 SQFT R-30
800/1000 = 0.8 x U-value 0.0262 = 0.0210
200/1000 = 0.2 x U-value 0.0333 = 0.0067
0.021 + 0.0067 = 0.0277
1/0.0277 = R-36.10

The reality in the field is that raised heel or energy trusses are already required by the code because an 8-10" heel height is needed to achieve R-30 over the top plate where baffles are installed. (8" of blown cellulose and 8-10"+ for fiberglass are needed to achieve an R-30)

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RE54-13

Final Action: AS AM AMPC____ D

RE55-13
R402.2.2 (IRC N1102.2.2)

Proposed Change as Submitted

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R402.2.2 (N1102.2.2) Ceilings without attic spaces. Where Section R402.1.1 would require insulation levels above R- 30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, ~~the minimum required insulation for such roof/ceiling assemblies shall be R-30~~ the residential building shall be required to utilize the *U*-factor alternative approach in Section R402.1.3, the total UA alternative in ~~of~~ Section R402.1.4, or Section 405 to demonstrate code compliance. ~~This reduction of insulation from the requirements of Section R402.1.1 shall be limited to 500 square feet (46 m2) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.~~

Reason: The R-values have been established to achieve a specific level of quantifiable energy performance. If the levels cannot be achieved in a specific building assembly alternative compliance paths are available that will demonstrate that the assembly meets the requirements of the code.

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

R402.2.2-EC-SCHWARZ

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this in preference to the language and approach in RE53-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.2 Ceilings without attic spaces. Where Section R402.1.1 ~~would~~ ~~require~~ requires insulation levels above R- 30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the ~~residential~~ building shall ~~be required to~~ utilize the *U*-factor alternative approach in Section R402.1.3, the total UA alternative in ~~of~~ Section R402.1.4, or section 405 Simulated Performance Alternative to demonstrate code compliance.

Commenter's Reason: The committee disapproved this in preference to the language and approach in RE53-13. However RE53-13 dealt with section 402.2.1 **Ceilings with attic spaces** and this proposal is dealing with section 402.2.2 **Ceilings without attic spaces**. The R-values have been established to achieve a specific level of quantifiable energy performance. If the levels cannot be achieved in a specific building assembly alternative compliance paths are available that will demonstrate that the assembly meets the requirements of the code.

RE55 -13

Final Action: AS AM AMPC____ D

RE56-13

R202 (NEW) (IRC N1101.9), R402.2.3 (IRC N1102.2.3), R402.2.3.1 (NEW) (IRC N1102.2.3.1 (NEW)), R402.2.3.2 (NEW) (IRC N1102.2.3.2 (NEW)), Chapter 5

Proposed Change as Submitted

Proponent: Forrest Fielder, CBO, Arizona Building Officials (fielder_4@msn.com)

Revise as follows:

R402.2.3 (N1102.2.3) ~~**Eave baffle**~~ **.Vented attics.** Roof assemblies containing vented attics shall comply with 402.2.3.1 and 402.2.3.2.

R402.2.3.1 (N1102.2.3.1) Eave baffle. For air permeable insulation in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

R402.2.3.2 (N1102.2.3.2) Radiant barriers. In Climate Zones 1, 2, and 3, vented attics shall contain radiant barriers, as tested in accordance with ASTM C1313M-12 and installed in accordance with ASTM C1743-12

> **Exception:** Attics containing no HVAC space conditioning equipment or attics with a maximum of 10 lineal feet of supply or return ducting.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

RADIANT BARRIER. A material having a low emittance surface (0.1 or less) and where installed in building assemblies, the low emittance surface shall face a ventilated or unventilated air space.

Add new standards to Chapter 5 as follows:

ASTM C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

ASTM C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction

Reason: In cooling climates, attic radiant barriers (ARBs) have been shown to conserve substantial amounts of energy by reducing temperatures in vented attics. Lower attic temperatures slow the rate of temperature differential – driven heat transfer from ceiling envelope elements and HVAC equipment and ducting.
Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas, and numerous demonstration projects and studies have confirmed the energy savings and cost-effectiveness of these installations. Such radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Reference Home Guidelines. Some 650 million square feet of radiant barriers are installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, "Standard Specification for Sheet Radiant Barriers for Building Construction Applications," and ASTM C1743, "Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction". This proposal requires the use of radiant barriers in a manner consistent with the existing language in the Energy Star for Homes – "Version 3, Exhibit 1" and, additionally, requires that the radiant barriers comply with the two ASTM standards just referenced.

The Department of Energy (DOE) has published the "Radiant Barrier Fact Sheet that is available on the DOE website through the following link: http://www.ornl.gov/sci/ees/etsd/btric/RadiantBarrier/RBFactSheet2010.pdf

A comprehensive review of radiant barrier studies was performed by Mario Medina, Ph.D. P.E. "This paper provides a general description of RBs, including installation configurations, the physical principles that make them work, and the laboratory and field experiments used to evaluate their thermal performance. An extensive review of the literature is summarized, highlighting fundamental issues, such as reduced ceiling heat flows, reduced space cooling and heating loads, and changes in attic temperatures produced by the installation of RBs in residential attics." The document has been mentioned here as an additional reference related to radiant barrier product information and to highlight the scope of "benefit" studies that have been completed.

The study entitled "Radiant Barrier Impact on Selected Building Performance Measurements Model Home Case Study", authored by B.E. Davis and J. Tiller, from the Appalachian State University Energy Center, sponsored by Centex Homes in Charlotte, NC, demonstrates the energy savings associated with the use of radiant barriers in attics. In the study, two identical homes were fit with over sixty sensors, where one house contained a radiant barrier (designated as the "Belmont" home) and one did not. The house with the radiant barrier had a peak attic temperature drop by 23%, and the improved efficiency of the cool air delivered through the ducts was 57%.

The current language in the Energy Star for Homes – "Version 3, Exhibit 1" requires the use of radiant barriers in vented attics of the reference home, with an exception for attics containing no HVAC space conditioning equipment and a maximum of 10 linear feet of supply or return ducting.

[1] Department of Energy "Radiant Barrier Fact Sheet" prepared by the Oak Ridge National Laboratory (2012).
[2] Medina, Mario, "A Comprehensive Review of Radiant Barrier Research Including Laboratory and Field Experiments", report prepared for the Reflective Insulation Manufacturers Association.
[3] **Davis, Bruce Eugene & Tiller, Jeffrey, "Radiant Barrier Impact on Selected Building Performance** Measurements, Model Home Case Study, Centex Homes".

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

Analysis: A review of the standards proposed for inclusion in the code, ASTM <u>C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications, and C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction</u> with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R402.2.3-EC-FIELDER

Committee Action Hearing Results

For staff analysis of the content of ASTM C1224-11 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Disapproved

Committee Reason: No data has been provided to establish the impact on energy use in a building.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Forest Fielder, CBO, Arizona Building Officials, representing self, requests Approval as Modified by this Public Comment.

Modify the proposed change as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

~~**RADIANT BARRIER.** A material having a low emittance surface (0.1 or less) and where installed in~~

~~building assemblies, the low emittance surface shall face a ventilated or unventilated air space.~~

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

(*Portions of code change proposal not shown remain unchanged.)*

Commenter's Reason: In response to the committee indicating that this proposal did not include "impact of energy use", the following text/calculations have been added. This data was taken from the DOE Fact Sheet and exemplifies savings for this product type in Climate Zones 1, 2 and 3. The modified proposal includes a new definition for *radiant barrier*, to be consistent with an existing IBC definition. The proponent requests approval as modified.(AM).

The Department of Energy (DOE) has published the "Radiant Barrier Fact Sheet that is available on the DOE website through the following link: http://www.ornl.gov/sci/ees/etsd/btric/RadiantBarrier/RBFactSheet2010.pdf
Values taken from this DOE document are utilized in the "Savings Benefit to the Home Owner" section below.

Savings Benefit to the Home Owner:
Cost Calculator – to home owner – new structure – hip roof:

☐ Product Cost - Radiant Barrier OSB Panel – $0.11 per sq. ft. (takes into account waste) 4

☐ 2,000 sq. ft. house, ranch, hip roof

☐ 2,200 sq. ft. of roof area x $0.11 per sq. ft. (radiant barrier cost) = $242.00

☐ Cost to home owner - $242.00

☐ Additional cost added to monthly payment of a 30 year mortgage – 4% fixed interest rate:
• $242.00 @ 4% = addition of $1.16 to the monthly payment

Savings Benefit to the Home Owner:

☐ Cost to add Radiant Barrier OSB - $1.16 per month (per above)

☐ 2,000 sq. ft. house, ranch, hip roof

☐ Savings as calculated in the Department of Energy "Radiant Barrier Fact Sheet"

☐ Code level insulation with well-sealed ducts in the attic
• Zone 1 - $0.03 per sq. ft. x 2,000 sq. ft. = $60.00 / 12 months = $5.00 per month
• Zone 2 - $0.03 per sq. ft. x 2,000 sq. ft. = $60.00 / 12 months = $5.00 per month
• Zone 3 - $0.02 per sq. ft. x 2,000 sq. ft. = $40.00 / 12 months = $3.33 per month

☐ The cost for energy is based on first year (2012) values – if increases in energy cost due to inflation and other factors occur – annual savings will increase proportionally.

In summary, this exercise exemplifies the immediate energy cost savings that are netted when a radiant barrier is included in the design of a new home in Climate Zones 1, 2 and 3 with "well-sealed" ducts in the attic. The cost to the new home is small and the energy savings are significant over the life of the home.

RE56 -13
Final Action: AS AM AMPC____ D

RE57-13

R202 (NEW) (IRC N1101.9 (NEW)), R402.2.3, (N1102.2.3) R402.2.3.1 (NEW) (IRC N1102.2.3.1 (NEW)), R402.2.3.2 (NEW) (IRC N1102.2.3.2 (NEW), Chapter 5

Proposed Change as Submitted

Proponent: Wesley Hall, Reflectix, Inc., representing self (wes.hall@reflectixinc.com)**,** Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (Vickie@InterCodeinc.com)

Revise as follows:

R402.2.3 (N1102.2.3) Vented Attics. Sections 402.2.3.1 and 402.2.3.2 shall apply to roof assemblies containing vented attics.

R402.2.3.1 (N1102.3.1) Eave baffle. For air permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. The baffle shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

R402.2.3.2 (N1102.2.3.2) Radiant barrier*.* Radiant barriers, used to supplement insulation in Climate Zones 1, 2, and 3, shall comply with the requirements of ASTM C1313 and shall be installed in accordance with ASTM C1743.

~~**R402.2.3 (N1102.2.3) Eave baffle.** For air permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.~~

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

Add new standards to Chapter 5 as follows:

ASTM
C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction

Analysis: A review of the standards proposed for inclusion in the code, ASTM C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications, and C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Reason: (HALL) Radiant barriers are a viable building option, widely distributed and have an established place in the market. The purpose of this proposal is to provide information and references for radiant barriers.

The content of this proposal contains product requirements and references that will aid the contractors and code officials in recognizing and understanding radiant barrier products and correct installation procedures.

Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas. These products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Homes Guidelines. Some 650 million square feet of the product is being installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, "Standard Specification for Sheet Radiant Barriers for Building Construction Applications," and ASTM C1743, "Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction". This proposal does not require the use of radiant barriers but requires that, when they are used, they comply with the two ASTM standards just referenced.
ASTM C1743-12 can be viewed at: http://reflectixinc.com/literature/securedpdfs/C1743.pdf

(LOVELL) The use of radiant barriers in vented attics in hot climates has been shown to conserve substantial amounts of energy by reducing the temperatures in the attic. If the attic temperature is lower, that slows the rate of temperature differential and transfers heat away from ceiling envelope elements and HVAC equipment and ducting. Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas, and numerous demonstration projects and studies have confirmed the energy savings and cost-effectiveness of these installations. Such radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Homes Guidelines. Some 650 million square feet of the product is installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, "Standard Specification for Sheet Radiant Barriers for Building Construction Applications," and ASTM C1743, "Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction". This proposal requires the use of radiant barriers in a manner consistent with the existing language in the Energy Star for Homes – "Version 3, Exhibit 1" and, additionally, requires that the radiant barriers comply with the two ASTM standards just referenced.
The Department of Energy (DOE) has published the "Radiant Barrier Fact Sheet that is available on the DOE website through the following link: http://www.ornl.gov/sci/ees/etsd/btric/RadiantBarrier/RBFactSheet2010.pdf
Values taken from this DOE document are utilized in the "Savings Benefit to the Home Owner" section below.
A very comprehensive study was performed by Mario Medina. "This paper provides a general description of RBs, including installation configurations, the physical principles that make them work, and the laboratory and field experiments used to evaluate their thermal performance. An extensive review of the literature is summarized, highlighting fundamental issues, such as reduced ceiling heat flows, reduced space cooling and heating loads, and changes in attic temperatures produced by the installation of RBs in residential attics. The document has been mentioned here as an additional reference related to radiant barrier product information and to highlight the scope of "benefit" studies that have been completed.
The study entitled "Radiant Barrier Impact on Selected Building Performance Measurements Model Home Case Study, authored by B.E. Davis and J. Tiller, from the Appalachian State University Energy Center, sponsored by Centex Homes in Charlotte, NC, and demonstrates the energy savings associated with the use of radiant barriers in attics. In the study, two identical homes were fit with over sixty sensors, where one house contained a radiant barrier (designated as the "Belmont" home) and one did not. The house with the radiant barrier had a peak attic temperature drop by 23% and the improved efficiency of the cool air delivered through the ducts was 57%.
The current language in the Energy Star for Homes – "Version 3, Exhibit 1" requires the use of radiant barriers in vented attics, with an exception for attics containing no HVAC space conditioning equipment and a maximum of 10 linear feet of supply or return ducting.
Cost Calculator – to home owner – new structure – hip roof:

- Product Cost - Radiant Barrier OSB Panel – $0.11 per sq. ft. (takes into account waste) [4]
- 2,000 sq. ft. house, ranch, hip roof
- 2,200 sq. ft. of roof area x $0.11 per sq. ft. (radiant barrier cost) = $242.00
- Cost to home owner - $242.00
- Additional cost added to monthly payment of a 30 year mortgage – 4% fixed interest rate:
- $242.00 @ 4% = addition of $1.16 to the monthly payment

Savings Benefit to the Home Owner:

- Cost to add Radiant Barrier OSB - $1.16 per month (per above)
- 2,000 sq. ft. house, ranch, hip roof
- Savings as calculated in the Department of Energy "Radiant Barrier Fact Sheet"

➢ Code level insulation with well-sealed ducts in the attic

- Zone 1 - $0.03 per sq. ft. x 2,000 sq. ft. = $60.00 / 12 months = $5.00 per month
- Zone 2 - $0.03 per sq. ft. x 2,000 sq. ft. = $60.00 / 12 months = $5.00 per month
- Zone 3 - $0.02 per sq. ft. x 2,000 sq. ft. = $40.00 / 12 months = $3.33 per month

➢ The cost for energy is based on first year (2012) values – if increases in energy cost due to inflation and other factors occur – annual savings will increase proportionally.

In summary, this exercise exemplifies the immediate energy cost savings that are netted when a radiant barrier is included in the design of a new home in Climate Zones 1, 2 and 3 with "well-sealed" ducts in the attic. The cost to the new home is small and the energy savings are significant over the life of the home.

References:

Davis, Bruce Eugene & Tiller, Jeffrey, "Radiant Barrier Impact on Selected Building Performance Measurements, Model Home Case Study", Appalachian State University Energy Center, USA, 2009.
Medina, M. A., "A Comprehensive Review of Radiant Barrier Research Including Laboratory and Field Experiments." Paper CH-12-C051, ASHRAE Transactions, Vol. 118, Part 1, 2012.
ASTM C1743-12 can be viewed at: http://reflectixinc.com/literature/securedpdfs/C1743.pdf.

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

R402.3 (NEW)-EC-HALL

Committee Action Hearing Results

For staff analysis of the content of ASTM C1224-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Disapproved

Committee Reason: An installation standard, if needed, should apply to installation everywhere, not just in vented attics. Given that the proposed standards do not agree with all roofing industry materials installation issues, the material installation, when used, should be contained in manufacturer's installation instructions and construction specifications based upon specific roofing materials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, Intercode, Inc., representing Reflective Insulation Manufacturers Association-International requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.3.2 (N1102.2.3.2) Radiant barrier. Radiant barriers, used to supplement insulation ~~in Climate Zones 1, 2, and 3,~~ shall comply with the requirements of ASTM C1313 and shall be installed in accordance with ASTM C1743 <u>or in accordance with the manufacturer's installation instructions</u>.

(*Portions of code change proposal not shown remain unchanged.)*

Commenter's Reason: This proposal does not require the use of radiant barriers but requires that, when they are used, they comply with the two appropriate ASTM standards referenced for proper product specification and installation.

There was some confusion on the part of the committee regarding the reason for inclusion of radiant barrier in a section titled "vented attics". This is the primary location that these types of products are installed and it was for this reason this section was selected. The product is not roofing material specific. This is a proven technology and has been in the market place for 24+ years and over 650 million square feet installed annually. Two revisions to the text were incorporated as suggested by the committee:

- Climate zones 1, 2 and 3 were struck, although these are where the product is primarily installed – it was deemed important for this language to pertain to the product wherever installed
- A reference to "manufacturer's installation instructions" was added

The content of this proposal contains product requirements and references that will aid contractors. This public comment language will also assist code officials with enforcement in recognizing and understanding radiant barrier products and correct installation procedures, for a product not currently referenced at all.

The current state and city codes that include radiant barrier are:
• HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
• TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
• FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
• CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

RE57 -13
Final Action: AS AM AMPC____ D

RE58-13
R402.2.4 (IRC N1102.2.4)

Proposed Change as Submitted

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

> **Exception:** Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the requirements of Table R402.1.1 based on the applicable climate zone specified in Chapter 3.

Reason: As currently written, this provision is being interpreted in some jurisdictions as requiring vertical doors providing access to certain unconditioned spaces such as attics to meet the thermal insulation levels of the surrounding wall they are installed in rather than the thermal requirements for doors contained in Table R402.1.1 applicable to the building thermal envelope. The thermal performance requirements for these vertical doors should be no greater than those for exterior doors installed elsewhere in the building thermal envelope.

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

R402.2.4-EC-INKS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This exception is unnecessary. The code allows this approach, and this needs not be stated.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Craig Conner, Building Quality, representing himself, requests Approval as Submitted.

Commenter's Reason: It seems to be "common sense" that a door would meet the requirements for a door. The code just needs to be clear. Why would a door to unconditioned space have more stringent requirements than a door to the outside?

Public Comment 2:

Stephen Turchen, Fairfax County, VA, representing Virginia Building and Code Officials Association requests As Modified by this Public Comment.

Modify the proposal as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

> **Exception:** Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the fenestration requirements of Table R402.1.1 based on the applicable climate zone specified in Chapter 3.

Commenter's Reason: This code change proposal should be modified to align the proposal with the proponent's intent. IECC Table R402.1.1 contains requirements for R-values of opaque assemblies and U-factors of fenestration. The proposed modification clarifies that the vertical access door to the unconditioned space shall meet the fenestration requirement of the table. Absent this requirement, it could be reasonably interpreted that the vertical access door shall meet the R-value equivalent of the surrounding wall, as currently stated in Section R402.2.4, which would not resolve the issue the proponent was trying to address.

RE58 -13

Final Action: AS AM AMPC____ D

RE59-13
R402.2.4 (IRC N1102.2.4)

Proposed Change as Submitted

Proponent: Joel Rodriguez, Gwinnett County, Georgia, representing Metropolitan Atlanta Inspector's Association (MAIA) (joel.rodriguez@gwinnettcounty.com)

Revise as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level <u>in accordance with the following insulation values:</u>

1. <u>Hinged vertical doors shall have a maximum *U*-Factor of U-0.20 (R-5 minimum);</u>
2. <u>Hatches/scuttle hole covers shall have a maximum *U*-Factor of U-0.05 (R-19 minimum); and</u>
3. <u>Pull down stairs shall have a maximum *U*-Factor of U-0020 with a minimum of 75 percent of the panel area having (R-5 minimum) insulation.</u>

~~equivalent to the insulation on the surrounding surfaces.~~ Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation. <u>There shall be a floor or landing on top of the ceiling joist with a minimum width of 10 inches (254 mm) around the perimeter of access hatches and pull down stairs into an attic area.</u>

Reason: To eliminate the conflict in the insulation requirement language in TABLE R402.1.1 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT, TABLE R402.1.3 EQUIVALENT U-FACTORS and 402.2.3 Fenestration access hatches and doors. To insulate to the levels specified in R402.2.4 Access hatches and doors compared to the above insulation requirements is expensive, in some cases not practical. It doesn't make sense to require R-30 to R-49 insulation on a hatch or pull down stairs when one can have a skylight that is *U*-FACTOR 0.55-0.75 (les than R-2). The calculated additional energy costs between and R-5 and R-30 is approximately $7.00 per year for Climate Zoe 4 (based on the methodology listed in ASHRAE Handbook Fundamentals for 10 SF pull down stairs. (Electricity cost based on $0.11 KWH and Natural Gas $0.70 Therm). To require a door into an attic to be R-13 to R-20+ doesn't make sense when a n exterior door or window exposed to the outside can be R-2 to R-3 (*U*-FACTOR 0.32-0.55). The manufacturers of doors, pull down stairs and hatches currently manufacture fenestration that meets these proposed insulation requirements. There is not a manufacturer that makes an R-13 or better door and the only way to achieve an R-30 or better with pull down stairs is to build or install a separate cover over the pull down stairs. This can create an unsafe entrance into the attic because the step up will be 16 inches or more, and that conflicts with IRC R311.7.5.1 Risers.

Cost Impact: The code change proposal will not increase the cost of construction. The savings will be a minimum of $200 per opening.

R402.2.4-EC-RODRIGUEZ

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This provides for the same reduction in ceiling insulation values on attic access doors in all climate zones, and without regard to the size of the opening or percentage of opening. This could mean a drastic drop in insulation in cold climate zones.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Joel Rodriguez, Gwinnett County, GA, representing Metropolitan Atlanta Inspectors Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access hatches and doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weather-stripped and insulated to a level equivalent to the insulation on the surrounding surfaces. ~~in accordance with the following insulation values:~~

~~1. Hinged vertical doors shall have a maximum *U*-Factor of U-0.20 (R-5 minimum);~~
~~2. Hatches/scuttle hole covers shall have a maximum *U*-Factor of U-0.05 (R-19 minimum); and~~
~~3. Pull down stairs shall have a maximum *U*-Factor of U-0020 with a minimum of 75 percent of the panel area having (R-5 minimum) insulation.~~

Exception. Horizontal pull down stair type access hatches in ceiling assemblies shall be permitted to meet the following requirements provided the net area of a framed opening is less than or equal to 13.5 square feet and there are no more than two horizontal access hatches in insulated ceiling assemblies located remotely from each other. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

1. In Climate Zones 1 through 3 pull down stair access hatches shall have an average maximum *U*-Factor of U-0.20 (R-5 minimum).
2. In Climate Zones 4 through 6 pull down stair access hatches shall have an average maximum *U*-Factor of U-0.10 (R-10 minimum).

Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation. ~~There shall be a floor or landing on top of the ceiling joist with a minimum width of 10 inches (254 mm) around the perimeter of access hatches and pull down stairs into an attic area.~~

Commenter's Reason: In the Report of the Hearings the Code Development Committee reason for disapproval stated "*This provides for the same reduction in ceiling insulation values on attic access doors in all climate zones, and without regard to the size of the opening or percentage of opening. This could mean a drastic drop in insulation in cold climate zones."* This public comment restructures the original proposal to address the concerns of the Committee and provide workable code language to address the main issue of Section R402.2.4 (N1102.2.4) for pull down stair type access hatches. The issue is that pull down stair type access hatches that are placed in horizontal ceiling assemblies must be insulated to values significantly more stringent that fenestration products located in these same ceiling assemblies.

For example, in Table R402.1.1 Skylights are required to meet a U-factor that ranges from 0.75 in Climate Zone 1 to 0.55 in Climate Zone 8. In addition, Section R402.3.3 allows up to 15 square feet of the fenestration per dwelling unit (which includes skylights) to be exempt from the requirements in Table 402.1.1. It does not make sense to require R-30 to R-49 insulation for a pull down stair type access hatch in an insulated ceiling when one can have a skylight up to 15 square feet in area that is exempt from the envelope requirements or that has a *U*-FACTOR of 0.55-0.75 (less than R-2). Insulating pull down stair access hatches to the levels specified in R402.2.4, compared to the skylights insulation requirements is expensive, and in many cases not practical.

In addition, affordable, pre-manufactured pull down stair access systems are not readily available to meet the R-30 to R-49 target. As a result, field customization of access hatches is sometimes employed to achieve these performance levels. Inspection and verification for compliance becomes a challenge. Long term system performance of these field customized entry devices may also vary. Commonly used insulated covers are designed to be removed and placed on the adjacent attic joists resulting in the insulation being compressed thus reducing its effectiveness. Providing sufficient air sealing around the hatch that remains durable long term is difficult. Also, the removal of the insulated covers for access present a safety hazard to service personnel, inspectors and building owners having to stand on ladders while removing the hatches.

Quality standardized manufactured pull down stair systems however provide a safer, permanent access with proven performance for the life of the structure. Factory built energy rated access systems provide consistent air sealing performance and ensure consistent energy performance while helping to maintain air quality through reduced air infiltration.

This proposal provides a solution by permitting a reasonable reduction in the insulation values for pull down stair access hatches that are less than or equal to 13.5 square feet (approximately 30" X 64") in attic ceilings. This maximum size accommodates most manufactured products available. The U-values provided for the two climate zone groupings match the increase in ceiling insulation levels from Table 402.1.1. These values specified, U-0.10 and 0.20 respectively, are less stringent than the U-values values specified for the insulated ceilings but in both cases are far more stringent than those permitted for skylights in all Climate Zones. In addition the proposal will permit no more than two pull down stairs with these less stringent U-values within the dwelling envelope. This too is more stringent than that permitted for skylights which can have one unit up to 15 square feet in size exempted from the code requirements and all others less stringent than the pull down stair assemblies proposed. Finally, the proposal also does not allow this reduction to be factored into the U-Factor alternative calculation procedure in R402.1.3 or the total UA alternative procedure in R402.1.4. This is consistent with the limitations in Section 402.2.1 for ceilings with attic spaces.

RE59 -13

Final Action: AS AM AMPC____ D

RE61-13
R402.2.7 (IRC N1102.2.7)

Proposed Change as Submitted

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

R402.2.7 (N1102.2.7) Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. <u>Insulation supports for batt insulation shall be installed so that spacing is no more than 24 inches on center and shall not compress the insulation. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.</u>

> <u>**Exception:** Where foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed from the top of the vent to below the lower surface of the floor insulation at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation.</u>

Reason: The 2012 IECC currently requires insulation installed in a floor system to maintain permanent contact with the underside of the subfloor decking. Insulation support systems, if not installed properly, can compress the insulation degrading the insulation R-value. This proposal requires that insulation supports not compress the installed insulation to ensure that it maintains its full R-value.

The second portion of the code change proposal focuses on the installation of foundation vents in relation to the installed insulation. Foundation vents that are installed at the same level as the insulation can direct air directly at the insulation reducing the R-value of the product through windwashing. Insulation will also act as a barrier to ventilation air, reducing the effectiveness of the foundation vent. This proposal will require that foundation vents either be installed below the line of insulation, or when not possible, require the installation of baffles to direct the ventilation air below the insulation

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

R402.2.7-EC-MAKELA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal includes a requirement for no compression of the installation. In practicality, there will be some compression, if very little. However, the proposed text makes no allowance for that.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Eric Makela, Britt Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.7 (N1102.2.7) Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports for batt insulation shall be installed so that spacing is no more than 24 inches on center ~~and shall not~~ with <u>minimal compression of</u> ~~compress~~ the insulation. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.

Exception: Where foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed from the top of the vent to below the lower surface of the floor insulation ~~at an angle of 30° from horizontal,~~ to divert air flow below the lower surface of the floor insulation.

Commenter's Reason: The IECC Code Development provision disapproved this proposal for the following reason:

"The proposal includes a requirement for no compression of the installation. In practicality, there will be some compression, if very little. However, the proposed text makes no allowance for that. "

This Public Comment modifies the provision by allowing some compression of insulation per the committees reason statement. Also the Public Comment eliminates the specific angle of the baffle to direct ventilation air below the insulation. This will allow more flexibility in the field and increase enforceability.

RE61 -13

Final Action: AS AM AMPC____ D

RE62-13
R402.2.13 (NEW) (IRC N1102.2.13 (NEW))

Proposed Change as Submitted

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

R402.2.13 (N1102.2.13) Mechanical rooms. Where a room contains combustion equipment, and outside air is admitted directly into the room to provide combustion air for the equipment, then the walls, ceilings, and floors of that room bound unconditioned space and shall be insulated as part of the *building thermal envelope*.

Reason: AHJs have disagreed regarding how to apply the energy code to "mechanical rooms" with permanently installed air ducts directly connecting the room to the outdoor environment. This proposal attempts to apply the code requirements to these rooms in a feasible and enforceable manner. Note that by identifying the enclosure of the mechanical room as part of the thermal envelope, these surfaces will be sealed as well as insulated, thereby preventing unwanted and energy-consuming air intrusion into the conditioned living space adjacent to the mechanical room.

Cost Impact: To the extent that mechanical rooms have previously been considered unconditioned space and were enforced as such, this clarifying proposal has no cost impact. If these rooms were previously uninsulated, there will be some costs associated with insulating the customary framed walls and ceiling of the room, as well as sealing potential avenues of air infiltration to the conditioned living space beyond.

R402.2.13 (NEW)-EC-EGGERTON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This provision for a separate room for mechanical equipment outside of the thermal envelope is an excessively restrictive proposal that is not needed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ellen Eggerton, Fairfax County, Virginia, representing the Virginia Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2.13(N1102.2.13) Mechanical rooms. In climate zones 3 through 8, where a room contains ~~combustion~~ fuel fired equipment, and outside air ~~is admitted~~ enters directly into the room to provide combustion air ~~for the equipment~~, the room shall be located outside the *building thermal envelope* or the room shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.~~, then the walls, ceilings, and floors of that room bound unconditioned space and shall be insulated as part of the *building thermal envelope*.~~ Doors into such a room shall be fully gasketed. Supply and return ducts shall be insulated to R-6.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with the requirements of Sections R402.4.2 and IRC R1006 of the *International Residential Code*.

Commenter's Reason: Changed to apply requirement only to heating climates, clarify the language and refer to the requirements of table R402.1.1. This also adds exceptions.

RE62 -13

Final Action: AS AM AMPC____ D

RE63-13
Table R402.1.1 (IRC Table N1102.1.1), R402.2.13 (NNEW) (IRC N1102.2.13 (NEW))

Proposed Change as Submitted

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

(Portions of Table not shown remain unchanged)

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. ~~If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.~~

R402.2.13 (N1102.2.13) Walls with partial structural sheathing. Where Section R402.1.1 would require continuous insulation on exterior walls and structural sheathing covers 40 percent or less of the gross area of all exterior walls, the continuous insulation *R*-value shall be permitted to be reduced by an amount necessary to result in a consistent total sheathing thickness, but not more than R-3, on areas of the walls covered by structural sheathing, This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Reason: This is a clarification not intended to change the meaning of the code. Moving the relevant text out of the footnote and into a separate code section allows for a more thorough description of the sheathing reduction allowance.

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

R402.2.13 (NEW)-EC-WILLIAMS

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal clarifies the issue of structural sheathing with continuous insulation presently contained in footnote h of Table R402.1.1. The information is appropriately placed in the body of code text.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Paul Coats, American Wood Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

(Portions of Table not shown remain unchanged)

h. First value is cavity insulation, second is continuous insulation or insulated siding, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation or insulated siding.

R402.2.13 (N1102.2.13) Walls with partial structural sheathing. Where continuous insulation is used to comply with Section R402.1.1, and ~~Where Section R402.1.1 would require continuous insulation on exterior walls and~~ structural sheathing covers 40 percent or less of the gross area of all exterior walls, the continuous insulation *R*-value shall be permitted to be reduced by an amount necessary to result in a consistent total sheathing thickness, but not more than R-3, on areas of the walls covered by structural sheathing. ~~This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.~~

Commenter’s Reason. As approved by the Committee, the first sentence implies that continuous insulation is required whenever footnote h applies. This is true for Climate Zones 6, 7, and 8, but is not true for Climate Zones 3, 4, and 5, where there are also cavity-only alternatives listed. For example, in Climate Zone 3 for wood frame wall R-value, there are two options, R20 and R13+R5. Since the continuous insulation option is not “required” but is an option along with full cavity insulation, it could be interpreted that the reduction in R-value is not permitted. Therefore the first modification is necessary.

In addition, the last sentence is unnecessary and could be problematic. The sentence attempts to emphasize that this provision would not affect the use of other approaches--the U-factors in Table R402.1.3 cannot be increased when using the U-factor alternative approach and the total UA approach. But the charging language in Section R402.2 makes it clear that this provision pertains only to the application of Table 402.1.1, and so inserting a prohibition against use with the other alternative approaches muddles the code and could cause confusion. For instance, it could be read to imply that U-factor increases for certain portions of a wall are somehow prohibited when using the total UA approach, which is incorrect.

RE63 -13

Final Action: AS AM AMPC____ D

RE64-13

R402.3 (NEW) (IRC N1102.3 (NEW)), R402.3.1 (NEW) (IRC N1102.3.1 (NEW)), Table 402.3.1 (NEW) (IRC Table N1102.3.1 (NEW)), Chapter 5

Proposed Change as Submitted

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Add new text as follows:

R402.3 (N1102.3) Solar Properties of Opaque Surfaces (prescriptive).

R402.3.1 (N1102.3.1) Roof Solar Reflectance and Thermal Emittance. Roofs having a slope less than 2:12, directly above cooled *conditioned spaces* in climate zones 1, 2, and 3 shall comply with at least one option in Table R402.3.1.

Exceptions: The following are exempt from the requirements in Table R402.3.1:

1. Portions of roofs that include or are covered by:
   1.1 Photovoltaic systems or components
   1.2 Solar air or water heating systems or components
   1.3 Roof gardens or landscaped roofs
   1.4 Above-roof decks or walkways
   1.5 Skylights
   1.6 HVAC systems, components, and other opaque objects mounted above the roof
   1.7 A radiant barrier is installed
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings
3. Ballasted roofs with a minimum stone ballast of 17 lbs/ft^2 (74 kg/m2) or 23 lbs/ft^2 pavers (117 kg/m^2)
4. Roofs where a minimum of 75% of the roof area meets a minimum of one of the exceptions above.

TABLE R402.3.1 (N1102.3.1)
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

Three-year aged solar reflectance[b] of 0.55 and three-year aged thermal emittance[b] of 0.75
Initial solar reflectance[b] of 0.70 and initial thermal emittance[b] of 0.75
Three-year-aged solar reflectance index[c] of 64
Initial solar reflectance index[c] of 82

a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either *solar reflectance* or *thermal reflectance*, shall be assigned both an initial *solar reflectance* of 0.10 and an initial *thermal emittance* of 0.90. Materials lacking three-year aged tested values for either *solar reflectance* or *thermal reflectance*, shall be assigned both a three-year aged *solar reflectance* of 0.10 and a three-year aged *thermal emittance* of 0.90.
b. Tested solar reflectance and thermal emittance shall be in accordance with ANSI/CRRC-1-2010.
c. Solar reflectance index (SRI) determined in accordance with ASTM E1980-11 using a convection coefficient of 2.1 BTU/h-ft^2-F (12W/m^2.K). Calculation of aged SRI shall be based on aged tested values. Calculation of initial SRI shall be based on initial tested values.

Add new standards to Chapter 5 as follows:

ASTM

E 1980-11 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces

CRCC Cool Roof Rating Council
1610 Harrison St
Oakland, CA 94612

ANSI/CRCC-1-2010 Cool Roof Rating Council CRCC-1 Standard

Reason: This proposed requirement applies to low-sloped roofs only and is consistent with requirements for commercial buildings in Section C402.2.1.1 of the 2012 IECC. Low-sloped roofs are commonly single-ply membranes, built-up roofs, modified bitumen membranes, and spray polyurethane foam. The U.S. DOE and Levinson report that high levels of reflectance for these types of roofs can typically be obtained for no cost increase over darker, less reflective roofs.

The low-slope DOE Cool Roof Calculator (http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm) reports these energy savings compared to a "black roof":

Climate Zone	Example City	Heating System Type	Net (Heating and Cooling) Annual Savings per 1000 ft^2 of roof area
2	Houston TX	Heat Pump	$22
		Natural Gas	$24
3	Atlanta GA	Heat Pump	$15
		Natural Gas	$17
Assumptions: R-30 insulation, 0.70 Solar reflectance, 0.75 thermal emittance, 12 cents/kWh electricity, $1.00/therm natural gas, 3.5 COP cooling, 2.0 COP heat pump heating, 80% AFUE gas heat.			

Studies illustrating the savings from cool roofs are available on the Cool Roof Ratings Council website. http://www.coolroofs.org/article.html#energy For example, the Florida Solar Energy Center tested seven retail shops in a strip mall in Cocoa, Florida over a two-year period, which allowed surface degradation over a year period to be accounted for. The roof was resurfaced to alter the surface reflectivity from approximately 29% to 75%. There was a 25.3% average reduction in summer space cooling energy in the seven shops.

References:

Parker, D., J. Sonne, J. Sherwin. 1997. Demonstration of Cooling Savings of Light Colored Roof Surfacing in Florida Commercial Buildings: Retail Strip Mall. Florida Solar Energy Center. Cocoa, Florida.
U.S. Department of Energy. 2010. Guidelines for Selecting Cool Roofs. Washington, D.C.
Levinson, R. 2012. The Case for Cool Roofs. Lawrence Berkeley National Laboratory. Berkeley, California. http://heatisland.lbl.gov/sites/heatisland.lbl.gov/files/Levinson_2012_Case%20for%20cool%20roofs.pdf

Cost Impact: The code change proposal may increase the cost of construction in certain situations.

Analysis: A review of the standards proposed for inclusion in the code, ASTM E1980-11 Standard Practice for calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces and CRRC Standard CRRC-1-2010 Cool Roof Raing Council CRRC-1 Standard with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R402.3 (NEW)-EC-WILLIAMS

Committee Action Hearing Results

For staff analysis of the content of ANSI/CRCC-1-2012 and ASTM E1980-11 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Approved as Modified

Modify the proposal as follows:

Revise date of referenced standard ANSI/CRCC-1 from 2010 to 2012.
In addition, revise footnote a as follows:

a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either *solar* ~~*reflectance*~~ *emittance* or *thermal* ~~*reflectance*~~ *emittance*, shall be assigned both an initial *solar* ~~*reflectance*~~ *emittance* of 0.10 and an initial *thermal emittance* of 0.90. Materials lacking three-year aged tested values for either *solar* ~~*reflectance*~~ *emittance* or *thermal* ~~*reflectance*~~ *emittance*, shall be assigned both a three-year aged *solar reflectance* of 0.10 and a three-year aged *thermal emittance* of 0.90.

Committee Reason: The modification to the reference year of the standard is to use the most recent edition of ANSI/CRCC-1. The modification to the footnote is to use the technically correct terminology. Cool roofs are a proven technology that is already required in the IECC-Commercial provisions. Cool roofs provide significant energy savings.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Amy Dickie, Global Cool Cities Alliance, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**R402.3.1 (N1102.3.1) Roof Solar Reflectance and Thermal Emittance.** Roofs having a slope less than 2:12, directly above cooled *conditioned spaces* in climate zones 1, 2, and 3 shall comply with at least one option in Table R402.3.1.~~

~~**Exceptions:** The following are exempt from the requirements in Table R402.3.1:~~
~~1. Portions of roofs that include or are covered by:~~
~~1.1 Photovoltaic systems or components~~
~~1.2 Solar air or water heating systems or components~~
~~1.3 Roof gardens or landscaped roofs~~
~~1.4 Above-roof decks or walkways~~
~~1.5 Skylights~~
~~1.6 HVAC systems, components, and other opaque objects mounted above the roof~~
~~1.7 A radiant barrier is installed~~
~~2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings~~
~~3. Ballasted roofs with a minimum stone ballast of 17 lbs/ft^2 (74 kg/m2) or 23 lbs/ft^2 pavers (117 kg/m^2)~~
~~4. Roofs where a minimum of 75% of the roof area meets a minimum of one of the exceptions above.~~

~~TABLE R402.3.1 (N1102.3.1)~~

~~Minimum Roof Reflectance and Emittance Options~~[a]

~~Three-year aged solar reflectance[b] of 0.55 and three-year aged thermal emittance[b] of 0.75~~
~~Initial solar reflectance[b] of 0.70 and initial thermal emittance[b] of 0.75~~
~~Three-year-aged solar reflectance index[c] of 64~~
~~Initial solar reflectance index[c] of 82~~

~~a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either *solar reflectance emittance* or *thermal emittance*, shall be assigned both an initial *solar reflectance emittance* of 0.10 and an initial *thermal emittance* of 0.90. Materials lacking three-year aged tested values for either *solar reflectance emittance* or *thermal emittance*, shall be assigned both a three-year aged *solar reflectance* of 0.10 and a three-year aged *thermal emittance* of 0.90.~~
~~b. b. Tested solar reflectance and thermal emittance shall be in accordance with ANSI/CRRC-1-2012.~~
~~c. c. Solar reflectance index (SRI) determined in accordance with ASTM E1980-11 using a convection coefficient of 2.1 BTU/h-ft^2-F (12W/m^2.K). Calculation of aged SRI shall be based on aged tested values. Calculation of initial SRI shall be based on initial tested values.~~

R402.3.1 (N1102.3.1) Roof Solar Reflectance and Thermal Emittance. Roofs having a slope less than or equal to 2:12, directly above cooled *conditioned spaces* in climate zones 1, 2, and 3 shall have an average aged solar reflectance of not less than 0.55 and an average aged thermal emittance of not less than 0.75.

Exceptions: The following are exempt from the requirements in this Section:
1. Portions of roofs that include or are covered by:
1.1 Photovoltaic systems or components
1.2 Solar air or water heating systems or components
1.3 Roof gardens or landscaped roofs
1.4 Above-roof decks or walkways
1.5 Skylights
1.6 HVAC systems, components, and other opaque objects mounted above the roof
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings
3. Ballasted roofs with a minimum stone ballast of 17 lbs/ft^2 (74 kg/m2) or 23 lbs/ft^2 pavers (117 kg/m^2)
4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.

R402.3.1.1 Alternative Compliance Pathways. Roofs or portions of roofs that comply with one or more of the following also shall be in compliance with R402.3.1.

1. An aged solar reflectance index of not less than 64.
2. An initial solar reflectance of not less than 0.70 and an initial thermal emittance of not less than 0.75.
3. An initial solar reflectance index of not less than 82.

R402.3.1.2 Roof testing. Roof product solar reflectance and thermal emittance shall be determined as follows:

1. The initial and aged solar reflectances and initial and aged thermal emittances of the roofing product shall be measured in accordance with the CRRC-1 Standard.
2. Initial and aged values of solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a medium wind speed convective coefficient of 2.1 BTU/(h · ft^2 · °F) [12 W/(m^2 · K)]. Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.
3. Materials lacking initial tested values for either solar reflectance or thermal emittance shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking aged tested values for either solar reflectance or thermal emittance shall be assigned both an aged solar reflectance of 0.10 and an aged thermal emittance of 0.90.

(*Portions of code change proposal not shown remain unchanged.)*

Commenter's Reason: We applaud the introduction of cool roof requirements for low sloped roofs in the residential code. These proposed modifications make the cool roof provisions in the residential code consistent with the cool roof provisions in the commercial code. Specifically, these modifications are consistent with the formatting of CE 122 which was approved as submitted by the committee. The major changes between the original proposed residential cool roof code and the proposed modifications in this comment are as follows:

1) Changes the definition of low-sloped roofs from a rise to run ratio of less than 2:12 to a rise to run ratio of less than or equal to 2:12. This change makes the definition of low-sloped roofs consistent with other codes (e.g. ASHRAE 90.1 and California's Title 24).

2) Reformat the code to state primary rating option (aged solar reflectance and aged thermal emittance) in the body of the code and the other rating options as exceptions. Note that although this change alters the format of the code, it has no influence on the stringency of the code.

3) Strikes out the radiant barrier exemption. A radiant barrier will achieve some of the same energy savings benefits as a cool roof, but it is not a complete substitute for a cool roof. Additional energy savings benefits can be gained from a cool roof regardless of whether a radiant barrier is in place.

4) Remove the specification of "three-year" from the notation of aged reflectivity and aged emissivity values because the duration of the aging is explicit in the CRRC-1 Standard, and should be changed as the standard evolves.

5) Move the footnotes that pertain to the testing requirements into a new section (Section R402.3.1.2), titled "Roof Testing". This change moves important definitions and requirements out of the footnotes, thus providing a cleaner format for the code.

Public Comment 2:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

TABLE R402.3.1 (N1102.3.1)
Minimum Roof Reflectance and Emittance Options[a]

Three-year aged solar reflectance[b] of 0.55 and three-year aged thermal emittance[b] of 0.75
Initial solar reflectance[b] of 0.70 and initial thermal emittance[b] of 0.75
Three-year-aged solar reflectance index[c] of 64
Initial solar reflectance index[c] of 82

a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either *solar reflectance* ~~*emittance*~~ or *thermal emittance*, shall be assigned both an initial *solar reflectance* ~~*emittance*~~ of 0.10 and an initial *thermal emittance* of 0.90. Materials lacking three-year aged tested values for either *solar reflectance* ~~*emittance*~~ or *thermal emittance*, shall be assigned both a three-year aged *solar reflectance* of 0.10 and a three-year aged *thermal emittance* of 0.90.
b. b. Tested solar reflectance and thermal emittance shall be in accordance with ANSI/CRRC-1-2012.

c. c. Solar reflectance index (SRI) determined in accordance with ASTM E1980-11 using a convection coefficient of 2.1 BTU/h-ft^2-F (12W/m^2.K). Calculation of aged SRI shall be based on aged tested values. Calculation of initial SRI shall be based on initial tested values.

d.

(*Portions of code change proposal not shown remain unchanged.)*

Commenter's Reason: The original proposal was approved. The committee statement said "*cool roofs are a proven technology that is already required in the IECC-Commercial provisions. Cool roofs provide significant energy savings.*"

The committee modified the proposal with two floor amendments. One of these amendments changed the incorrect term "thermal reflectance" to the correct term of "thermal emittance" in two locations in footnote a. However, the proposal (as published in the Report on the Committee Action) additionally had three instances of the term "solar reflectance" incorrectly changed to "solar emittance" in footnote a. This public comment is an editorial change to restore the proper term "solar reflectance" in footnote a, as contained in the original proposal.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

RE64 -13

Final Action: AS AM AMPC____ D

RE65-13

202 (NEW) (IRC N1101.9 (NEW)), R402.3.3 (NEW) (IRC N1102.3.3 (NEW)), Table R402.3.3 (NEW) (IRC Table N1102.3.3 (NEW)), R402.3.6 (IRC N1102.3.6)

Proposed Change as Submitted

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

R402.3.3 (N1102.3.3) SHGC Shading Adjustment. Vertical fenestration in Climate Zones 1 through 3 shall be permitted to meet the SHGC requirements of Table R402.3.3 based upon the calculated projection factor of any overhang, eave, or permanently attached shading device that covers the full width of the glazing and extends a minimum of 12 inches (0.3 m) beyond each side of thereof. Where different windows and glazed doors have different projection factors, they shall each be evaluated separately, or an area-weighted projection factor value shall be permitted.

TABLE R402.3.3 (N1102.3.3)
EQUIVALENT SHGC FOR VERTICAL FENESTRATION
WITH SHADING PROJECTIONS

Projection Factor	Maximum SHGC
PF < 0.2	0.25
0.2 ≤ PF < 0.5	0.30
PF ≥ 0.5	0.40

~~R402.3.6 (N1102.3.6)~~ R402.3.7 (N1102.3.7) Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1 and Section R402.3.3.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

PROJECTION FACTOR. The ratio of the horizontal depth of an overhang, eave, or permanently attached shading device, divided by the distance measured vertically from the bottom of the fenestration glazing to the underside of the overhang, eave, or permanently attached shading device.

Reason: The purpose of this proposal is to provide a prescriptive allowance for shading as an appropriate method for controlling solar gains in addition to glazing SHGC. Shading has been part of good building design for millennia, and its use should be encouraged. A prescriptive shading allowance is already included in the commercial IECC as well as ASHRAE 90.1, but is not currently included in the residential IECC, other than through the more complicated performance path.

The need to address shading has become even more important following the 2012 IECC, which introduced a very low 0.25 SHGC in zones 1-3. Even with the newest low-e coatings, it is borderline whether 0.25 SHGC can be achieved for certain products without the addition of tinted glass or a darker low-e, especially for picture windows and sliding glass doors that have a larger glass to frame ratio. Additionally, the low 0.25 SHGC could inhibit homeowners from replacing older inefficient windows, because the new 0.25 SHGC requirement would result in a mismatched appearance between the new replacement windows/doors and the rest of the windows.

Therefore, a shading credit is one way to provide flexibility for both new and replacement windows, while maintaining the overall solar control. This proposal is based on the same shading multipliers as in the commercial IECC, but simplified for easy enforcement in the residential code. Specifically, the shading allowance for south/east/west orientation is used to be conservative and account for the worst orientation, but written simply as an adjusted maximum SHGC that doesn't require determination of orientation by either the builder or code official. This is very conservative, requiring a 0.40 SHGC even for a 3 ft overhang over a 5 ft high window, providing good solar control while also allowing flexibility and promoting architectural shading.

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

402.3.3 (NEW) -EC-CULP

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: See RE66-13. In addition, this introduces the term 'weighted average' that in this context is ill defined.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.3.3 (N1102.3.3) SHGC shading adjustment. Vertical fenestration in climate zones 1 through 3 shall be ~~permitted to meet~~ considered in compliance with the SHGC requirements of Table R402.1.1 provided the requirements of Table R402.3.3 are satisfied based upon the calculated projection factor of any overhang, eave, or permanently attached shading device that covers the full width of the glazing and extends a minimum of 12 inches (0.3 m) beyond each side of thereof. Where different windows and glazed doors have different projection factors, they shall each be evaluated separately~~, or an area-weighted projection factor value shall be permitted~~.

(Portions of code change proposal not shown remain unchanged.)

Commenter's Reason: At the preliminary code development hearings, the committee first heard RE66, which also dealt with shading as an appropriate method for controlling solar gains in addition to glazing SHGC, but structured in a different manner than this proposal. With RE66, the committee was concerned about the potential consequences of allowing unlimited SHGC for a given minimum projection factor, and also concerned about the technical basis for the minimum projection factors used in that proposal. There were also concerns about the complexity of determining orientation during code enforcement.

In contrast, RE65 does not suffer from any of these problems. First and foremost, even if using a very large projection, RE65 is conservative and does not allow unlimited SHGC. For example, even a window under a large 6 ft patio overhang would still require a maximum SHGC of 0.40. This provides some flexibility and credit for the excellent shading being provided by the patio overhang, but does not give a complete "waiver" and still requires a basic solar control window to account for situations such ground reflectance.

Second, the values used in RE65 are directly based on the projection factor SHGC multipliers that are already in the commercial IECC. In fact, these multipliers have been used in the 2000, 2003, 2006, 2009, and 2012 IECC as well as ASHRAE 90.1-1999, 2001, 2004, 2007, 2010, and 2013. If it's been technically satisfactory and useful for both the IECC and ASHRAE commercial energy codes, then there should be no concern for the residential energy code.

Third, RE65 is easy to enforce by simply listing the required maximum SHGC based on the projection factor, without the need for either the builder or code official to determine orientation. This is because the requirement was purposely designed to be conservative and based upon the worst-case south/east/west orientation projection factor multiplier from the commercial IECC and ASHRAE 90.1.

Unfortunately, RE65 was caught up in the debate of RE66, and these points were missed by the committee. The committee did express a concern about the term "area-weighted projection factor", so the modification proposed in this comment removes that part. There is also an editorial modification to the first sentence, purely for clarification.

Finally, some opponents have acknowledged that shading is a good building practice, but argue that it should be restricted to the performance path. However, the performance path simply cannot be used for replacement fenestration. Also, the use of shading projections has been in the *prescriptive* path for both the commercial IECC and ASHRAE 90.1 for over 13 years, so there is obviously no valid reason to restrict it to only the performance path in the residential energy code.

The concept of using shading to reduce solar heat gain has been used in architecture for thousands of years. The code should recognize and encourage that. We ask that you vote "NO" on the initial motion for disapproval, and then to vote "YES" on a motion to approve RE65 as modified by this comment.

RE65 -13

Final Action: AS AM AMPC____ D

RE70-13

R402.3.6 (NEW) (IRC N1102.3.6 (NEW)), R402.2.13 (NEW) (IRC N1102.2.13 (NEW)

Proposed Change as Submitted

Proponents: Ellen Eggerton, representing Virginia Building and Code Officials Association; Harold A Stills, Jr., Hanover County, VA.., representing Virginia Building and Code Officials Association (hastills@hanovercounty.gov)

Add new text as follows:

R402.3.6 (N1102.3.6) Thermally isolated garage door *R-value*. For Climate Zones 4 through 8, when the garage is conditioned, the minimum garage door *R-value* shall be 5.0. All other fenestration shall meet the *building thermal envelope* requirements.

R402.2.13 (N1102.2.13) Thermally isolated garage insulation. All garages shall be thermally isolated and meet ceiling and wall *R*-values as specified in Table R402.1.1. Existing slabs shall be exempt from insulation requirements.

Reason: Eggerton: The current IECC does not allow for the average garage to be conditioned because the average garage door cannot meet the 0.35 U-factor. In addition, it is very difficult to find a garage door that has been tested according to "NFRC 100" (R303.1.3). If one searches for doors at an average big-box home improvement store, it is not difficult to find an insulated garage door with an R-6 or greater R-value.

A garage is not considered "habitable space", but some activities, (such as automobile and household item repair) do occur there. These activities do not require the same level of comfort as the habitable areas of the dwelling, but a temperature other than the current outdoor temperature may be desirable. The average homeowner also realizes that it would not be efficient to maintain this space at the same temperature as the rest of the dwelling.

The last sentence of 402.2.13 recognizes that adding a heating or cooling mechanical system to an existing garage would be acceptable after adding the required insulation to the walls and ceiling, but impractical to add slab insulation. However, ice-melting systems are allowed.

Stills: The current IECC does not allow for the average garage to be conditioned because the average garage door cannot meet the 0.35 U-factor. In addition, it is very difficult to find a garage door that has been tested according to "NFRC 100" (R303.1.3). If one searches for doors at an average big-box home improvement store, it is not difficult to find an insulated garage door with an R-6 or greater R-value. However, ice-melting systems are allowed. A garage is not considered "habitable space", but some activities, (such as automobile and household item repair) do occur there. These activities do not require the same level of comfort as the habitable areas of the dwelling, but a temperature other than the current outdoor temperature may be desirable. The average homeowner also realizes that it would not be efficient to maintain this space at the same temperature as the rest of the dwelling. The last sentence of R402.2.13 recognizes that adding a mechanical system to an existing garage would be acceptable after adding the required insulation to the walls and ceiling, but impractical to add slab insulation.

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

R402.3.6 (NEW)-EC-EGGERTON-STILLS

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R402.2.13 (N1102.2.13) Thermally isolated garage insulation. All conditioned garages shall be……

(Portions of code change not shown remain unchanged)

Committee Reason: This addresses an issue that comes up frequently in residential construction. The modification simply reflects the proponent's intent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Disapproval.

Commenter's Reason: This proposal results in unclear and unenforceable code. If this is intended to address the conversion of an unconditioned garage into a conditioned space, the code already addresses such conversions. If the proponent is seeking to provide an exception for such conversions, the proper place for such an exception is in Chapter 1 where such conversions are now addressed. (If it was located in Chapter 1, other approved changes sponsored by SEHPCAC would relocate it to the new existing buildings chapter. Among the issues with the proposal is that it uses the term 'thermally isolated" but the code defined term is 'thermal isolation". In proposed section R402.3.6 it uses 'thermally isolated in the title, but not in the text as a result any intent to require thermal isolation is lost. If the intent is to require thermal isolation – what standard does the thermal isolation have to meet? Where do the thermal isolation measures have to be applied? If the intent is for this to apply to newly constructed garages, what is the justification for them not to comply with the new construction standards?. Finally, the proposed final sentence of Section R402.4.6 is unclear. What does 'all other' refer to? All other fenestration in the structure – or that which is in the garage?

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RE70 -13
Final Action: AS AM AMPC____ D

RE72-13

R402.4 (IRC N1102.4), R402.4.1.1 (IRC N1102.4.1.1), R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.3 (New) (IRC N1102.4.1.3 (New))

Proposed Change as Submitted

Proponents: Craig Conner, Building Quality, representing self (craig.conner@mac.com); Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R402.4 (N1102.4) Air leakage ~~(Mandatory)~~. The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1.1 (N1102.4.1.1) Installation <u>(Mandatory)</u>. The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing <u>(Mandatory)</u>. The building or dwelling unit shall be tested ~~and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8~~<u>for air leakage</u>. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

<u>**R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive).** The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.</u>

Reason: Conner: This is exactly the online draft DOE posted. It makes the duct tightness tradable. DOE's posted reason statement said it well:

> *"Changing the envelope air leakage rate from mandatory to prescriptive will allow builders the option of trading improvements in other building components for less stringent pressure test results. This provides flexibility in meeting the requirements and options for recovering from an unexpected test failure. The proposed change retains a mandatory pressure test and leaves all other aspects of envelope sealing mandatory".*

Surrena: These modifications remove the mandatory maximum air tightness requirement and provide designers and builders the flexibility to trade-off building tightness with other performance path measures when using the performance path. Currently the building tightness requirement is mandatory and the 3 and 5 ACH tightness levels even under ideal circumstances, are very difficult to achieve. This will provide energy neutral trade-offs for expensive and sometimes unattainable requirements with other building improvements. This proposal does not change the stringency of the code it only increases the flexibility.

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

R402.4-EC-CONNER-SURRENA

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is an "energy neutral" trade-off", allowing duct tightness to be a trade-off when using the performance path.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Craig Conner, Building Quality, representing elf, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4 (N1102.4) Air leakage. The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1 Building thermal envelope. The building thermal envelope shall comply with sections R402.4.1.1 <u>through R402.4.1.3</u>~~and R402.4.1.2~~. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

R402.4.1.1 (N1102.4.1.1) Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested for air leakage. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

Commenter's Reason: This comment is exactly as posted as a DOE draft.

DOE's stated reason is "*This public comment is a minor correction to add a necessary callout to new Section R402.4.1.3*."

Public Comment 2:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4 (N1102.4) Air leakage. The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1.1 (N1102.4.1.1) Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested for air leakage. <u>The maximum air leakage rate in any building or dwelling unit under any compliance path shall not exceed 6 air changes per hour.</u> Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

Commenter's Reason: We recommend approval of RE72 as modified by this public comment. The current IECC sets the mandatory and prescriptive test requirements for building air leakage at the same air leakage level – 5 ACH 50 in climate zones 1-2 and 3 ACH50 in climate zones 3-8. Because these values may be difficult to achieve in some cases, we do not object to permitting air leakage to be traded off, to some degree, in the performance path for other reasonable energy efficiency improvements. However, there should be at least some limits on such trade-offs, particularly given other proposed changes to the performance path. As a result, we propose a mandatory maximum air leakage of 6 ACH50 be established – this will still leave reasonable room for more flexibility while ensuring some minimum level of performance.

Public Comment 3:

Michael D. Fischer, Kellen Company, representing Kellen Codes, Standards, and Regulatory Advocacy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R405.5.2(1)
PROPOSED DESIGN

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8 at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than 0.01 x CFA + 7.5 x (*N br* + 1) where: *CFA* = conditioned floor area N_{br} = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	~~For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences,~~ The measured air exchange rate[c]. The mechanical ventilation rate[d] shall be in addition to the air leakage rate and shall be proposed.

(Portions of Table and code change proposal not shown remain unchanged)

Commenter's Reason: This modification is a correction to address the performance path and ensure consistency regarding the requirement for testing to determine the measured air exchange rate.

Public Comment 4:

Hope Medina, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, requests Disapproval.

Commenter's Reason: We don't agree with the proponent's reason statement that 3 ACH is difficult because if the builder is constructing to table R402.4.1.1, 3 ACH is almost a given. But, we weren't too concerned with allowing some amount of trade off because we felt that you wouldn't be able to trade too much off and still pass overall compliance with the performance path. With that being said, because RE-166 brings back mechanical tradeoffs into the performance path we have to oppose trading off mechanical efficiency for building tightness. What good does it do to put an efficient piece of equipment into a leakier home especially when credit is being given for the more efficient equipment that was already going to be installed? Retrofitting a piece of the mechanical system is common over the life of the structure, but the durability of the building comes into play when it has a larger amount of air leakage.

Air tightness is an affordable methodology to providing durability and comfort to the homebuyer when the builders install the components of table R402.4.1.1 correctly at the time of construction. Once the construction has been completed it becomes difficult to address any air leakage problems later on and heroic measures must be performed.

There has been talk about adding an ACH tradeoff limit, which we could agree with if the equipment trade off had not been put into place, along with duct leakage tradeoffs that were approved, and the R-value roll backs that are proposed. All of the changes together would be too much of a setback for efficiency especially when each of these measures are being accomplished by builders every day.

Public Comment 5:

Charles Miller, City of Northampton, MA, representing self, requests Disapproval.

Commenter's Reason: It would seem that this modification while great for new construction would put an unfair burden on additions, which would then need to be isolated from the main structure and blower door tested or tested with a house, which is not required to be updated. In conjunction with Air sealing the definition of air sealing could use clear language as it does not confirm that an air barrier requires durable sealing of materials and T402.4.1.1 is confusing to both contractor and official.

RE72-13
Final Action: AS AM AMPC____ D

RE73-13

R402.4 (IRC N1102.4), R402.4.1 (IRC N1102.4.1), R402.4.1.1 (IRC N1102.4.1.1), R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.3 (NEW) (IRC N1102.4.1.3 (NEW)), R402.4.2 (IRC N1102.4.2), R402.4.3 (IRC N1102.4.3), R402.4.4 (IRC N1102.4.4)

Proposed Change as Submitted

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

R402.4 (N1102.4) Air leakage ~~(Mandatory)~~. The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1 (N1102.4.1) Building thermal envelope. The *building thermal envelope* shall comply with Sections R402.4.1.1 ~~and~~ ~~R402.4.1.2~~ through R402.4.1.3. ~~The sealing methods between dissimilar materials shall allow for differential expansion and contraction.~~

R402.4.1.1 (N1102.4.1.1) Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested for air leakage ~~and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8~~. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals)~~. Where required by the *code official*, testing shall be conducted~~ by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive). The *building* or *dwelling unit* shall have an air leakage rate that does not exceed 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

R402.4.2 (N1102.4.2) Fireplaces (Mandatory). New wood-burning fireplaces shall have tight-fitting flue dampers and outdoor combustion air.

R402.4.3 (N1102.4.3) Fenestration air leakage (Mandatory). Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m^2), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m^2), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

Exception: Site-built windows, skylights and doors.

R402.4.4 (N1102.4.4.) Recessed lighting (Mandatory). Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

Reason: The purpose of this code change is to clarify the code language related to air leakage, modify certain requirements, including changing a mandatory air leakage value to prescriptive and to require all necessary testing to be done by an approved third party. By changing the allowable tested air leakage rate from “mandatory” to “prescriptive,” this proposal would allow air leakage to be part of the tradeoff calculation under section R405 performance trade-offs. The result will maintain energy efficiency, while providing increased flexibility to the builder and an alternative path for cases in which a building fails the air leakage test or where achieving a low air leakage rate would be too difficult. This is an important consideration where the on-site testing requirement is already set at a tight level.

This proposal also adds objectivity and transparency by requiring that all required air leakage testing be administered by a code-official-approved third party. This proposal also reorganizes Section R402.4 to add clarity and simplicity to the code. However, it should be noted that this proposal does not change or tighten required values for tested air leakage, which were initially set in the 2012 *IECC*.

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

R402.4-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal is the same as RE72-13, except that verification testing by a 3rd party would be required. The committee disapproved this on the basis that it did not agree that 3rd party testing would be required.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R405.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	(*No change to this portion)*	~~For residences that are not tested, the same air leakage rate as the standard reference design.~~ ~~For tested residences,~~ the measured air

		exchange rate[c]. The mechanical ventilation rated shall be in addition to the air leakage rate and shall be as proposed.

(Portions of Table and code change proposal not shown remain unchanged.)

Commenter's Reason: This modification is a correction to address the performance path and ensure consistency regarding the requirement for testing to determine the measured air exchange rate.

RE73-13
Final Action: AS AM AMPC____ D

RE75-13
R402.4 (IRC N1102.4)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R402.4 (N1102.4) Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Section R402.4.1 through R402.4.4.

> <u>**Exception:** Dwelling units of R-2 Occupancies shall be permitted to comply with Section C402.4</u>

Reason: Air tightness testing for single family homes is very straightforward; however, it is much more difficult to accurately test multi-family buildings. Currently the code treats low-rise multi-family buildings, which are 3 stories or less, like single family homes and multi-family buildings of 4 stories or more like commercial buildings. Regardless of height, all multi-family buildings have the same air tightness testing complications, such as: Does the entire building need to be tested at one time? What about multi-family buildings with open corridors? Does every dwelling need to be tested? Can the leakages be averaged between units? Is the leakage tested only to the "outside" or should it include leakage to adjacent units?

By approving this change, low-rise multi-family buildings will avoid these complications, but yet will still held to the same level of performance as high rise (R-2) residential building as well as all commercial buildings.

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

Analysis. This exception will not appear in Chapter 11 of the IRC, since it is not applicable to the IRC.

R402.4 #1-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal would remove the requirement for an air barrier in Climate Zones 1, 2, and 3 because the reference to Section C402.4 leads to the general exception in Section C402.4.1.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Don Surrena, CBO, representing the National Association of Home Builders, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4 (N1102.4) Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Section R402.4.1 through R402.4.4.

> **Exception:** Dwelling units of Group R-2 Occupancies shall <u>not be required to be tested individually. Buildings of Group R2 Occupancies shall</u> be permitted to comply with Section ~~C402.4~~ <u>C402.4.1.1 and C402.4.1.2</u>.

Commenter's Reason: Air tightness testing for single family homes is very straightforward; however, it is much more difficult to accurately test multi-family buildings. Currently the code treats low-rise multi-family buildings, which are 3 stories or less, like single family homes and multi-family buildings of 4 stories or more like commercial buildings. Regardless of height, all multi-family buildings have the same air tightness testing complications, such as: Does the entire building need to be tested at one time? What about multi-family buildings with open corridors? Does every dwelling need to be tested? Can the leakages be averaged between units? Is the leakage tested only to the "outside" or should it include leakage to adjacent units?

By approving this change, low-rise multi-family buildings will avoid these complications, but will still be held to the same level of performance as high rise (R-2) residential building as well as all commercial buildings.

Two modifications are made by this comment, first, there is a perception that the leakage of each individual unit needs to be tested, this comment clarifies that this type of testing can be done, but is not required.

The second modification adds a requirement of an air barrier in Climate Zones 1, 2 and 3 which are exempted by commercial buildings. This addresses an issue raised at the Committee Action Hearings where the committee was concerned that this was a reduction in stringency.

RE75-13

Final Action: AS AM AMPC____ D

RE76-13

R402.2 (IRC N1102.2), R402.2.1 (NEW) (IRC N1102.2.1 (NEW)), Table R402.4.1.1 (NEW) (IRC Table N1102.4.1.1 (NEW))

Proposed Change as Submitted

Proponent: Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com); Jim Meyers, Southwest Energy Efficiency Partnership; Robby Schwarz, Energy Logic

Revise as follows:

R402.2 (N1102.2) Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12. Insulation shall also be installed in accordance with Table R402.4.1.1.

R402.2.1 (N1102.2.1) Insulation installation requirements (Mandatory). Insulation shall be installed in accordance with Table R402.4.1.1.

Delete Table R402.4.1.1 in its entirety and replace with new Table R402.4.1.1

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
General Requirements	A continuous air barrier shall be installed in the buildings thermal envelope and be in alignment with the insulation. Air permeable cavity insulation shall be installed in a six sided assembly. Breaks or joints in the air barrier shall be sealed with an air impermeable material to ensure that the air barrier system is impermeable to air movement. Air barriers shall be constructed and mechanically fastened to framing and sealed at edges, gaps, or voids with air sealing materials that are appropriate to the construction materials being sealed.	Air-permeable insulation shall not be used as a sealing material. Exterior thermal envelope insulation for framed walls and floors is installed in substantial contact and continuous alignment with building envelopes interior air barrier.
Ceiling / attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed. An air barrier at the drywall conditioned space and a ventilated attic is required	In any insulated ceiling or dropped ceiling/soffit, the insulation is substantially aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The drywall junction at the top plate of interior and exterior walls separating conditioned space from ventilated attic space shall be	Corners, headers, and interior wall intersections shall be insulated to a minimum of R-5. The insulation shall be installed according to manufacturer's instructions and/or industry

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
	sealed. Wall cavity insulation, including knee walls adjacent to attics, shall be encapsulated on six sides by an interior and exterior air barrier system The junction of the bottom plate of the exterior wall and floor sheathing shall be sealed.	standards which requires that the insulation material uniformly fills each cavity side-to-side, top-to-bottom, and without substantial gaps or voids. No exterior sheathing shall be visible from the building interior through gaps in the cavity insulation material. Wall and floor cavity insulation shall be enclosed on all six sides, and shall be in substantial contact with the sheathing material of the surface it is intended to insulate. For exterior applications of rigid insulation, insulation shall be in firm contact with the structural sheathing materials, and tightly fitted and sealed at joints. Faced batt insulation shall be surface stapled or inset stapled as long as inset stapled tabs are stapled neatly (no buckling), and provided the batt is only compressed at the edges of each cavity, to the depth of the tab itself. For sprayed or blown-in fibrous products, density shall be installed to the proper density to achieve the required R-value of the cavity it is installed in.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	Comply with narrow cavity requirements
Rim joists	The rim or band joists shall be sealed at all edges, cracks, and gaps and must have an exterior air barrier	
Floors (including above garage and cantilevered floors)	Floors shall encapsulate the cavity insulation on six sides by an interior and exterior air barrier system. The air barrier shall be sealed at all exposed edge/sides including connections between the house floor system and the floor system above unconditioned space.	Floor insulation shall be held in permanent contact with the underside of the subfloor decking and shall not be overly compressed by components that are used to hold it in place so that R-value is lost. Where an obstruction such as a duct or piping is installed in the floor cavity the insulation shall continue to be held in permanent contact with the underside of the subfloor decking, shall encapsulate the obstruction, and a minimum of an R- 19 shall be installed below the obstruction.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints sealed and edges sealed to the foundation walls and footings.	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls and extend from the vapor barrier covering the dirt floor to the sill attached to the top of the foundation. Where the floor system between the house and the crawl space is insulated it must conform with the floor insulation requirement described above.
Shafts, penetrations	Duct shafts, utility penetrations, wiring penetrations, plumbing penetrations, gas line penetrations, and flue shafts or other similar penetrations through the building envelope shall be sealed.	Insulation shall not extend through draft-stopping or fire-stopping openings. Use caulking rated for the application

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
Narrow cavities	Cavities too small to insulate, shall be sealed with an air barrier material.	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight and sealed to the drywall.	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated.
Plumbing and wiring	All plumbing, ductwork and wiring air barrier penetrations shall be sealed.	Batt insulation shall be cut neatly to fit around obstructions (such as blocking or bridging), and split, installed, and/or fitted tightly around wiring, plumbing, ducting, and other services in the cavity, or insulation that on installation readily conforms to available space shall encapsulate any obstruction in the cavity.
Shower / tub on exterior wall	Exterior walls adjacent to shower stalls, shower pans, and tubs shall have an air barrier installed separating conditioned space and exterior wall insulation. Tub and shower drain trap penetrations through the subfloor shall be sealed with an air barrier material.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical / phone box on exterior walls	Electrical, communication, or other boxes located in exterior walls, ceilings, or floors shall be air tight boxes or shall be made to be air tight using air barrier material's Bath fan housing adjacent to and or installed in unconditioned spaces shall be sealed to the drywall and made air tight.	Insulation completely fills voids between the box and exterior sheathing
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
Fireplace	Exterior walls adjacent to fireplace enclosures shall have an air barrier installed encapsulating and separating interior conditioned space and exterior wall insulation. Fireplaces shall have tight fitting doors	Exterior walls adjacent to fireplaces shall be insulated.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: Manufacturer instructions, best building practices, DOE's Building America program, Building Energy Code Programs, and other building educators all propose installing products and materials with best building practices and according to manufacturer instructions. However few go further than the code book to learn what best practices and manufactured instructions are. The intent of this new language is to clearly define air barrier and insulation requirements and installation practices that will lead to houses that can easily meet the air leakage standards of the energy code and ensure the performance of the stalled insulation materials.

The 2012 IECC also requires that insulation be installed correctly in order to comply with the air barrier requirements of the IECC. While it is important to install insulation correctly, this type of provision should not be linked to air sealing the house. This proposal provides two distinct sections to the table focused on either air sealing or insulation installation. It also provides a reference in the prescriptive requirements for insulation installation to the table.

Field experience shows that some trades continue to seal holes in the buildings enclosure with air permeable insulation, which is not best building practice does not meet manufacturers' intents for the use of their products.

When the 2009 IECC was released many code officials were introduced to the importance of air barriers and are still struggling to understand where and how an air barrier is integral to the building enclosure. This new language will better prepare trades, builders, and code officials with how and where air barriers should be installed. The quality of the installation and enforcement should increase due to greater clarity and specificity.

The air barrier and insulation table included in the 2009 and 2012 IECC do not require a minimum level of insulation for corners and headers. The new requirement specifies a minimum insulation value and also includes interior wall intersections that also reduce the possibility for full wall insulation in these areas of the building.

Field practice has found kneewalls that are not enclosed on the exterior (attic) vertical plane exhibit more air infiltration and provide the opportunity for insulation to fall away from kneewalls over time reducing the efficiency of the overall building.

Other field practices observed by raters include excessive compression of tabbed insulation batts when stapling the tabs to the side of the stud. This reduces insulation values and does not comply with manufacturer instructions. By adding this language to the table, insulation trades and others who install insulation will have a simplified description for installing batts and inset stapling.

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

R402.2-EC-MAKELA-MEYERS-SCHWARZ

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal is possibly good as a guide, but the text contains technical inconsistencies that make it undesirable for code text. In addition, the committee preferred RE85-12.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Eric Makela, Britt Makela Group, representing Northwest Energy Codes Group, Jim Meyers, representing Southwest Energy Efficiency Alliance, and Robby Schwarz, EnergyLogic, representing himself, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.2 Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12. Insulation shall also be installed in accordance with Table R402.4.1.1.

R402.2.1 Insulation installation requirements (Mandatory). Insulation shall be installed in accordance with Table R402.4.1.1.

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
General Requirements	A continuous air barrier shall be installed in ~~and~~ <u>alignment with</u> the <u>building's</u> thermal envelope ~~and be in alignment with the insulation.~~ ~~Air permeable cavity insulation shall be installed in a six sided assembly.~~ Breaks, ~~or~~ joints, <u>gaps, or voids</u> in the air barrier shall be sealed with an air impermeable material to ensure that the air barrier system is impermeable to air movement. Air barriers shall be installed ~~constructed and mechanically fastened to framing~~ and sealed ~~at edges so no gaps, or voids~~ with air sealing materials that are appropriate to the construction materials being sealed. <u>Air barriers shall be installed to keep outside air out of the building enclosure or inside air out of the building enclosure depending on climate or configuration and</u>	Air-permeable insulation shall not be used as a sealing material. Exterior thermal envelope insulation for ~~framed~~ walls and floors ~~is~~ <u>shall be</u> installed in substantial contact and continuous alignment with <u>the</u> building envelope<u>s</u> ~~interior~~ air barrier.

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
	sometimes shall be installed on the inside and outside of the building to do both.	
Ceiling / attic	The air barrier in any dropped ceiling/soffit shall be aligned with the ~~insulation and any gaps in the air barrier shall be sealed.~~ building's thermal envelope. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed or gasketed. A~~n~~ Continuous air barrier shall be installed between ~~at~~ the ~~drywall~~ conditioned space and a ventilated attic. ~~is required~~	~~In any insulated ceiling or dropped ceiling/soffit, the insulation is substantially aligned with the air barrier.~~ Access openings, drop down stair or knee wall doors shall be insulated to the same level as the assembly they are penetrating through.
Walls	The junction of the foundation and sill plate shall be sealed. The drywall junction at the top plate of interior and exterior walls separating conditioned space from unconditioned ~~ventilated attic~~ space shall be sealed or gasketed. Wall cavity insulation, including knee walls adjacent to attics, shall be encapsulated on six sides by an interior and exterior air barrier ~~system~~ The junction of the bottom plate of the exterior wall and floor sheathing shall be sealed.	All Corners, headers, and interior wall intersections shall be insulated ~~to a minimum of R-5.~~ The insulation shall be installed according to manufacturer's instructions and/or industry standards which requires that the insulation material uniformly fills each cavity side-to-side, top-to-bottom, and without substantial gaps or voids. No exterior sheathing shall be visible from the building interior through gaps in the cavity insulation material. Wall ~~and floor cavity~~ insulation shall be enclosed on all six sides, and shall be in substantial contact with the sheathing material of the surface it is intended to insulate. ~~For exterior applications of rigid insulation, insulation shall be in firm contact with the structural sheathing materials, and tightly fitted and sealed at joints.~~ Faced batt insulation shall be surface stapled or inset stapled as long as inset stapled tabs are stapled neatly (no buckling), and provided the batt is only compressed at the edges of each cavity, to the depth of the tab itself. ~~For~~ Sprayed or blown-in ~~fibrous products~~ insulation products, ~~density~~ shall be installed to the proper depth and density to achieve the required R-value of the cavity it is installed in.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	Comply with narrow cavity requirements
Rim joists	The Rim or band joists shall be sealed at all edges, cracks, and gaps and ~~must~~ shall have an exterior air barrier	
Floors (including above garage and cantilevered floors)	Floors air barriers shall encapsulate the cavity insulation ~~on six sides by~~ with an interior and exterior air barrier ~~system~~. The air barrier shall be sealed at all	~~Floor insulation shall be held in permanent contact with the underside of the subfloor decking and shall not be overly compressed by components that are used to hold it in place so that R-value is lost.~~

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
	exposed edge/sides including connections between the house floor system and the floor system above unconditioned space.	~~If an obstruction (such as a duct or piping) is installed in the floor cavity the insulation shall continue to be held in permanent contact with the underside of the subfloor decking, shall encapsulate the obstruction, and a minimum of an R- 19 shall be installed below the obstruction.~~ Floor framing cavity insulation shall be installed to maintain permanent contact with underside of subfloor decking and shall not be overly compressed so as R-value is lost by components that are used to hold it in place If an obstruction (such as a duct or piping) is installed in the floor cavity option A or B is allowed Option A The insulation shall be held in permanent contact with the underside of the subfloor decking, shall fully encapsulate the obstruction, and a minimum of an R- 19 shall be installed below the obstruction. Option B Floor framing cavity insulation shall be permitted to be in contact with the topside of the exterior sheathing or continuous insulation installed on the bottom side of floor framing, and insulation shall extends from the bottom to the top of all perimeter floor framing members that is equal to or greater then the R-value reqirements of the exterior walls.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints sealed and edges sealed to the foundation walls and footings.	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls and extend from the vapor barrier covering the dirt floor to the sill attached to the top of the foundation. Where the floor system between the house and the crawl space is insulated it must conform with the floor insulation requirement described above.
Shafts, penetrations	Duct shafts, utility penetrations, wiring penetrations, plumbing penetrations, gas line penetrations, and flue shafts or other similar penetrations through the building envelope shall be sealed.	Insulation shall not extend through draft-stopping or fire-stopping openings. Use caulking rated for the application
Narrow cavities	Cavities too small to insulate, shall be sealed with an air barrier material.	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight	Recessed light fixtures installed in the building thermal envelope shall be air tight,

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION INSTALLATION CRITERIA
	and sealed to the drywall.	IC rated.
Plumbing and wiring	~~All plumbing, ductwork, and wiring air barrier penetrations shall be sealed.~~ All penetration through the air barrier caused by running plumbing, ductwork, or wiring shall be sealed	Batt insulation shall be cut neatly to fit around obstructions (such as blocking or bridging), and split, installed, and/or fitted tightly around wiring, plumbing, ducting, and other services in the cavity, or insulation that on installation readily conforms to available space shall encapsulate any obstruction in the cavity.
Shower / tub on exterior wall	Exterior walls adjacent to shower stalls, shower pans, and tubs shall have an air barrier installed separating conditioned space and the exterior wall insulation. Tub and shower drain trap penetrations through the subfloor shall be sealed with an air barrier material.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical / fan / phone box on exterior walls/ceilings	Electrical, communication, or other boxes located in exterior walls, ceilings, or floors shall be air tight boxes or shall be made to be air tight using air barrier material's Bath fan housing adjacent to and or installed in unconditioned spaces shall be sealed to the drywall and made air tight.	Insulation completely fills voids between the box and exterior sheathing
HVAC register boots	HVAC supply or return registers/boots that penetrate the buildings thermal envelope shall be sealed to the subfloor or drywall.	
Fireplace	Exterior walls adjacent to fireplace enclosures shall have an air barrier installed encapsulating and separating interior conditioned space and exterior wall insulation. Fireplaces shall have tight fitting doors	Exterior walls adjacent to fireplaces shall be insulated.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Commenter's Reason: Manufacturer instructions, best building practices, DOE's Building America program, Building Energy Code Programs, and other building educators all propose installing products and materials with best building practices and according to manufacturer instructions. However few go further than the code book to learn what best practices and manufactured instructions are. The intent of this new language is to clearly define air barrier and insulation requirements and installation practices that will lead to houses that can easily meet the air leakage standards of the energy code and ensure the performance of the stalled insulation materials.

The 2012 IECC also requires that insulation be installed correctly in order to comply with the air barrier requirements of the IECC. While it is important to install insulation correctly, this type of provision should not be linked to air sealing the house. This proposal provides two distinct sections to the table focused on either air sealing or insulation installation. It also provides a reference in the prescriptive requirements for insulation installation to the table.

Field experience shows that some trades continue to seal holes in the buildings enclosure with air permeable insulation, which is not best building practice does not meet manufacturers' intents for the use of their products.

When the 2009 IECC was released many code officials were introduced to the importance of air barriers and are still struggling to understand where and how an air barrier is integral to the building enclosure. This new language will better prepare trades, builders, and code officials with how and where air barriers should be installed. The quality of the installation and enforcement should increase due to greater clarity and specificity.

The air barrier and insulation table included in the 2009 and 2012 IECC do not require a minimum level of insulation for corners and headers. The new requirement specifies a minimum insulation value and also includes interior wall intersections that also reduce the possibility for full wall insulation in these areas of the building.

Field practice has found kneewalls that are not enclosed on the exterior (attic) vertical plane exhibit more air infiltration and provide the opportunity for insulation to fall away from kneewalls over time reducing the efficiency of the overall building.

Other field practices observed by raters include excessive compression of tabbed insulation batts when stapling the tabs to the side of the stud. This reduces insulation values and does not comply with manufacturer instructions. By adding this language to the table, insulation trades and others who install insulation will have a simplified description for installing batts and inset stapling.

This Public Comment corrects some of the concerns expressed by opponents of the proposal.

RE76-13

Final Action: AS AM AMPC____ D

RE79-13
Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proposed Change as Submitted

Proponent: Brian Dean (Brian.Dean@icfi.com), Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION INSPECTION

(Portions of Table not shown remain unchanged)

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. ~~If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.~~

Reason: The purpose of this code change is to clarify and enhance compliance with and enforcement of the codes by organizing air barrier and insulation installation requirements into two separate checklists in the table. The proposal also updates and improves the language in the table to add clarity and to ensure that crucial elements of the thermal envelope are effectively sealed, installed and verified.

The proper installation of insulation and reasonable control of air leakage are both critical to achieving energy savings in homes. Although every building or dwelling unit is currently required to be tested for air leakage, a better-organized and more specific enumeration of key insulation and sealing requirements will lead to tighter, better-insulated, more energy efficient homes. The two columns are largely based on current insulation installation requirements and air barrier criteria in the 2012 IECC. We expect that as technology advances, and as building and inspection practices improve, this list will be updated. The reorganization of the requirements as presented above will facilitate that regular improvement in future code editions.

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

R402.4.1.1T #2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Proponent recommended disapproval given action on RE63-13.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of RE79 as submitted for the reasons stated in our original reason statement. While RE63 moves the language addressed by RE79 from a footnote to code text and we have submitted a public comment for approval as modified on that proposal, if RE63 is not approved as modified, we will be requesting that this code change be adopted to remove the exception.

RE79-13

Final Action: AS AM AMPC____ D

RE80-13
Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proposed Change as Submitted

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

Component	Criteria
Garage separation	Air sealing <u>and thermal separation</u> shall be provided between the garage and conditioned space <u>for all joints, service penetrations, and fenestrations</u>.

(Portions of Table not shown remain unchanged.)

Reason:
1. Sealing helps mitigate air movement into or out of the conditioned space, thereby reducing energy needs in mitigating uncontrolled air movement.
2. Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The impact would be $500 depending on geography for a 2000/sqft home, but the ROI would be 3-5 years depending on region, design, etc.

R402.4.1.1T #2-EC-SCHMEIDA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Rather than clarifying, the propose language provides unnecessary language to a provision that is presently understood.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT		CRITERIA
Garage separation	<u>Air sealing shall be provided between the garage and conditioned spaces.</u>	<u>Batt insulation cut neatly to fit around, or insulation that on installation readily conforms to available space, shall be installed around any shaft or penetration through the thermal envelope.</u>

		Batt insulation cut neatly to fit between door jambs and framing, or insulation that on installation readily conforms to available space, shall be installed between door jambs and framing.

Commenter's Reason: This modification does the following over the original submittal:

1. Makes the language more consistent with the rest of this section of the code, per testimony given in the public hearings.
2. Adapts the requested change to the format of RE85 as it was approved in the public hearings.

The addition of insulation ensures continuity in the thermal envelope, countering conductive thermal leaks around the fenestration not mitigated by sealing only.

RE80-13

Final Action: AS AM AMPC____ D

RE81-13
Table R402.4.1.1 (IRC N1102.4.1.1)

<u>Proposed Change as Submitted</u>

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLTION

COMPONENT	CRITERIA[a]
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed <u>on both the interior and exterior with a middle insulating layer filling the gap between the fenestration and framing/opening.</u>
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.

Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason:

1. Installing a seal on both the interior and exterior side helps mitigate infiltration as well as exfiltration of air into or out of the wall assembly, thereby reducing energy needs in mitigating uncontrolled air movement.
2. Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The cost would be negligible.

R402.4.1.1T #3-EC-SCHMEIDA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The provision as written provides for a scenario where the sealing method as configured could cause moisture problems.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLTION

COMPONENT		CRITERIA[a]
Windows, Skylights and Doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	Batt insulation cut neatly to fit between window/door jambs and framing and skylights and framing, or insulation that on installation readily conforms to available space, shall be installed between window/door jambs and framing and skylights and framing.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

(Portions of Table not shown remain unchanged)

Commenter's Reason: This modification does the following over the original submittal:

1. Makes the language more consistent with the rest of this section of the code, per testimony given in the public hearings.
2. Adapts the requested change to the format of RE85 as it was approved in the public hearings.

The addition of insulation ensures continuity in the thermal envelope, countering conductive thermal leaks around the fenestration not mitigated by sealing only.

RE81-13

Final Action: AS AM AMPC____ D

RE82-13
Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proposed Change as Submitted

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

Table R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Shafts, penetrations	Duct shafts, utility penetrations and flue shafts opening to exterior or unconditioned space shall be sealed <u>on both conditioned and unconditioned side of the opening with an insulating layer between the seals.</u>

(Portions of Table not shown remain unchanged.)

Reason:
1. Installing a seal on both the interior and exterior side helps mitigate infiltration as well as exfiltration of air into or out of the wall assembly, thereby reducing energy needs in mitigating uncontrolled air movement.
2. Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The cost would be negligible.

R402.4.1.1T #4-EC-SCHMEIDA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Consistent with committee's disapproval of RE81-13. The proponent requested disapproval.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

COMPONENT	<u>AIR BARRIER CRITERIA</u>	<u>INSULATION INSTALLATION CRITERIA</u>
Shafts, Penetrations	<u>Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.</u>	<u>Batt insulation cut neatly to fit around, or insulation that on installation readily conforms to available space, shall be installed around any shaft or penetration through the thermal envelope.</u>

Commenter's Reason: This modification does the following over the original submittal:

1. Makes the language more consistent with the rest of this section of the code, per testimony given in the public hearings.
2. Adapts the requested change to the format of RE85 as it was approved in the public hearings.

The addition of insulation ensures continuity in the thermal envelope, countering conductive thermal leaks around the fenestration not mitigated by sealing only.

RE82-13
Final Action: AS AM AMPC____ D

RE83-13
Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proposed Change as Submitted

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA[a]
Walls	Cavities within corners and headers shall be insulated by completely filling the cavity with a material having a thermal resistance of R3 per inch minimum. ~~and~~ The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.

(Portions of Table not shown remain unchanged)

Reason: The current text says, "Corners and headers shall be insulated …" All headers and corners under all circumstances? Insulated to what level? This provision is a carryover of the 2009 IECC requirement. Varying answers to these questions have already lead to varying interpretations of the code requirements, uneven enforcement, and confusion in the regulated community. This proposal intends to allay some of that confusion by specifying that headers and corners must be insulated when there is an available cavity (e.g., a two-ply 2x header in a 2x4 wall leaves no cavity to fill) and by providing a practical definition of what *insulated* means in this context. Typical insulating materials like fiberglass and rigid foam can easily achieve R3 per inch.

Cost Impact: There will be a cost impact from this proposal to the extent that this requirement was not previously enforced due to ambiguity in the requirement. Regardless, the quantities of insulation being installed are small, but there may be many of these areas to insulate, depending on the size, design, and layout of the proposed residential building.

R402.4.1.1T-EC-EGGERTON

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

First sentence in "Criteria" column:

Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R3 per inch minimum.

Committee Reason: This a practical approach for an air barrier in corners and headers of frame walls. The modification is made to qualify where sealing is needed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Don Surrena, CBO, representing the National Association of Home Builders, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA[a]
Walls	Cavities within corners and headers shall be insulated by completely filling the cavity ~~with a material having a thermal resistance of R3 per inch minimum~~. The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.

(Portions of Table not shown remain unchanged)

Commenter's Reason: While filling the cavity with insulation can provide an energy benefit; once a specific R-value per inch is required, there is a responsibility by the builder and inspector to verify this value. Who is to say that the installed density of a loose fill or partial batt insulation meets the requirement? Nearly all insulating materials will typically meet this requirement but this may add to the confusion rather than solve any problem.

The current language may create a situation where the builder uses "extra" wood as a nailer for siding or drywall (wood R-value approximately 1.25 per inch) and the interpretation is that it does not meet the requirements.

Changing the language to simply "filling the cavity" meets the intent without burdening the code official to verify the R-value requirement and potentially argue over necessary framing members within the wall.

RE83-13

Final Action: AS AM AMPC____ D

RE88-13
R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.2.1 (NEW) (IRC N1102.4.1.2.1 (NEW))

Proposed Change as Submitted

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested by an *approved* agency and verified as having an air leakage rate of not exceeding ~~5~~ 4 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). ~~Where required by the *code official*, testing shall be conducted by an *approved* third party.~~ A written report of the results of the test shall be signed by the testing agency ~~party conducting the test~~ and provided to the *code official*. Testing shall be performed at any time after creation and sealing of all penetrations of the *building thermal envelope*.

402.4.1.2.1 (N1102.4.1.2.1) The air leakage rate in Climate Zones 3 through 8 shall be permitted to be no greater than 4 air changes per hour where all heating and conditioning ducts, air handlers, and filter boxes are located within the *building thermal envelope.*

Reason: Building envelope tightness is a proven energy efficiency measure. With recent improvements in construction techniques and quality control, builders have demonstrated their ability to comply with air barrier requirements in the code as well as above-code programs. At the same time, the location of air handling ducts within the building thermal envelope has also become a more common and desirable construction technique- especially with new provisions for unvented attics in the IRC. This proposal offers a compromise that establishes a slight improvement in air barrier performance in the southern climate zones, as well as a trade-up in Climate Zones 3-8 that encourages the use of unvented attics.

Cost Impact: This proposal may result in an increased initial construction cost in some climate zones depending upon the method of construction, but is likely to provide a short break-even point on energy consumption and utility costs.

R402.4.1.2-EC-FISCHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This is would be a weakening of the code stringency. In addition, 3rd party testing is not necessary.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael Fischer, Kellen Company, representing the Center for the Polyurethanes Industry, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4.1.2 Testing. The building or dwelling unit shall be tested by an *approved* agency and verified as having an air leakage rate of not exceeding 5 ~~4~~ air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). A written report of the results of the test shall be signed by the testing agency and provided to the *code official*. Testing shall be performed at any time after creation and sealing of all penetrations of the *building thermal envelope*.

~~**402.4.1.2.1** The air leakage rate in Climate Zones 3 through 8 shall be permitted to be no greater than 4 air changes per hour where all heating and conditioning ducts, air handlers, and filter boxes are located within the *building thermal envelope.*~~

Commenter's Reason: This proposal originally contained two separate concepts: a requirement that blower door testing be performed by approved testing agencies and an ACH trade-off for buildings where the air movement system components are located within the thermal envelope. During the debate, there was a lack of consensus on the value of the trade-off. We are bringing this public comment forward without the trade-off, but preserving the concept that blower door testing be completed by an approved testing agency.

The current code language establishes the use of an approved agency as an exception rather than the rule. Since producers of other components of the building thermal envelope are required to use third party entities to demonstrate compliance with test requirements, and the same requirement for testing by an approved agency should apply for testing of the building air barrier. The control of air leakage is the last line of defense against the transmission of heat through the building envelope; it is critical that the same consideration for insulation and fenestration be applied to the air barrier testing.

RE88-13

Final Action: AS AM AMPC____ D

RE90-13
R402.4.1.2 (IRC N1102.4.1.2), Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and ~~3~~ 4 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

Table R405.5.2(1) (N1105.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour in Climate Zones 1 and 2, and ~~3~~4 air changes per hour in Climate Zones 3 through 8 at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area Nbr = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences, the measured air exchange rate[c]. The mechanical ventilation rated shall be in addition to the air leakage rate and shall be as proposed.

(Portions of table not shown remain unchanged)

Reason: Building tightness is an important part of an energy efficient and comfortable house; however, 3 air changes per hour at 50 Pascals is an extremely low target tightness especially for smaller homes. The ASHRAE Handbook of Fundamentals shows that less than 10% of new homes achieve 3 ACH or less. Four ACH is still an aggressive tightness level which will provide a tight, comfortable, energy efficient home for the consumer.

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

R402.4.1.2-EC-SURRENA

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This is a decrease in stringency relative to the 2012 IECC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Ryan, representing the International Association of Building Officials requests As Modified by this Public Comment.

Table R405.5.2(1) (N1105.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour ~~in Climate Zones 1 and 2, and 4 air changes per hour in Climate Zones 3 through 8~~ at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area Nbr = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences, the measured air exchange rate[c]. The mechanical ventilation rated shall be in addition to the air leakage rate and shall be as proposed.

(Portions of table not shown remain unchanged)

Commenter's Reason: Building tightness is an important part of an energy efficient and comfortable house; however, 3 air changes per hour at 50 Pascals is an extremely low target tightness especially for smaller homes. Three air changes per hour not only is unusually tight, it also has the potential of causing indoor air quality problems if the ventilation systems are not installed or do not work properly. Five air changes per house is a reasonable air tightness rate that resembles a challenging but fair "minimum code" requirement.

This requirement has been changed to 5 ACH in nearly every jurisdiction that has adopted the 2012 IECC including: Illinois, Utah, local jurisdictions in Kansas, Missouri. In addition states that are in the adoption process of the 2012 IECC are all considering increasing the air tightness up to 5 ACH50.

RE90-13
Final Action: AS AM AMPC____ D

RE93-13
R402.4.1.3 (NEW) (IRC N1102.4.1.3 (NEW))

Proposed Change as Submitted

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Add new text as follows:

R402.4.1.3 (N1102.4.1.3) Connection to Garage. The building or dwelling unit shall be tested and verified as being separate from an attached garage. While the blower door is being utilized to test the building or dwelling unit's leakage rate, the connection between the dwelling unit and the garage shall also be tested. The pressure in the garage with reference to dwelling unit shall not be less than 45 Pascals relative to the dwelling unit when the dwelling unit pressure is at 50 Pascals relative to the outside.

Reason: Separation between the house(dwelling unit) and garage is specifically called out on the air barrier and insulation table R402.4.1.1 yet it is unclear what is meant by this and why it is called out separately from the rest of the thermal envelops sealing that separates conditioned space from unconditioned space. The rational is an extension of efficiency into safety to ensure that pollutants and contaminants form the garage will not enter the home. A visual or written reference to this makes no sense when a test is available to ensure that separation has occurred. Testing is the only way to ensure safety and in extension greater efficiency.

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

R402.4.1.3 (NEW)-EC-SCHWARZ

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was not supported by technical justification related to the energy efficiency impact. In addition, no cost justification was provided.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4.1.3 (N1102.4.1.3) Connection to Garage. The building or dwelling unit shall be tested and verified as being separate from an attached garage. While the blower door is being utilized to test the building or dwelling unit's leakage rate, the connection between the dwelling unit and the garage shall also be tested. ~~The pressure in the garage with reference to dwelling unit shall not be less than 45 Pascals relative to the dwelling unit when the dwelling unit pressure is at 50 Pascals relative to the outside.~~ The connection between the dwelling unit and the garage shall not be more than 10% of the total measured CFM@50 leakage of the dwelling unit.

Commenter's Reason: The link between efficiency and house tightness has been proven. The separation between the house (dwelling unit) and the garage is specifically called out in the air barrier and insulation table R402.4.1.1 largely due to the complexity of the framing and the difficulty and importance of sealing off the garage from the house. The code language, however, is unclear. Why is garage separation specifically called out separately from the rest of the thermal envelope and air barrier sealing that separates conditioned space from unconditioned space? In this location I believe the connection between life safety and energy efficiency is the reason to ensure that pollutants and contaminants from the garage will not enter the home and why specific consideration is given to separating the garage in the code. The problem is that a visual inspection cannot ensure separation and therefore cannot ensure efficiency or safety of the occupants. Testing is the only way to ensure safety and in extension greater efficiency.

RE93-13

Final Action: AS AM AMPC____ D

RE94-13
R402.4.3 (IRC N1102.4.3)

Proposed Change as Submitted

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R402.4.3 (N1102.4.3) Fenestration air leakage. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m2), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m2), when tested according to NFRC 400 or AAMA/ WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

> ~~**Exception:** Site-built windows, skylights and doors.~~

Reason: This proposal is primarily a clean-up. The exception for site-built fenestration was removed from the commercial requirements during the last code development cycle as there is no justification for allowing it. These assemblies are required to meet the air leakage provisions of C402.4.3 for IECC commercial construction. Likewise, site-built windows, skylights and doors, if used in IECC residential construction, should meet the requirements of Section R402.4.3 without exception.

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

R402.4.3-EC-INKS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal was made with no cost justification. In addition this would remove flexibility for the builder from the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeff Inks, Window & Door Manufacturers Association requests Approval as Submitted.

Commenter's Reason: As was pointed out in the proposal, the exception for site-built fenestration was removed from the commercial requirements during the last code development cycle as there is no justification for allowing it.

By definition (see below) site-built fenestration is still comprised of factory fabricated components. These assemblies are different from "field fabricated" (also see below) which are not comprised of factory fabricated components. Because "site-built" components are factory fabricated for a specific use/assembly, specimen units can be assembled and tested by the manufacturer which is why these assemblies are required to meet the air leakage provisions of C402.4.3 for IECC commercial construction. Likewise, site-built windows, skylights and doors, if used in IECC residential construction, should meet the requirements of Section R402.4.3 without exception.

Removing this exception also does not remove any flexibility with respect to using these products. It simply requires for them to also meet the air leakage requirements which for the reasons stated above is reasonable.

Concerns regarding limits on flexibility can be addressed by making the exception applicable to field fabricated products.

"FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems. "

"FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration. "

Public Comment 2:

Jeff Inks, Window & Door Manufacturers Association requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4.3 Fenestration air leakage. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m2), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m2), when tested according to NFRC 400 or AAMA/ WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

Exception: Field-fabricated windows, skylights and doors.

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration.

Commenter's Reason: This public comment addresses the committee's concern that deleting the air leakage exception for "site-built" fenestration would remove flexibility for the builder. This modification simply replaces "Site-built" with "Field-fabricated" and adds the "Field-fabricated" definition already established in the commercial provisions of the IECC.

For the reasons stated below, we do not believe an exception for "site-built" products as defined by the IECC is warranted. Approval of this proposal as modified by this public comments actually adds an exception that technically does not exist currently so it should improve the flexibility rather than restrict it.

Regarding removal of the exception for "site-built", as was pointed out in the original proposal, the exception for site-built fenestration was removed from the commercial requirements during the last code development cycle as there is no justification for allowing it.

By definition (see below) site-built fenestration is still comprised of factory fabricated components. These assemblies are different from "field fabricated" (as defined by the IECC and proposed for inclusion in the residential provisions) which are not comprised of factory fabricated components. Because "site-built" components are factory fabricated for a specific use/assembly, specimen units can be assembled and tested by the manufacturer which is why these assemblies are required to meet the air leakage provisions of C402.4.3 for IECC commercial construction. Likewise, site-built windows, skylights and doors, if used in IECC residential construction, should meet the requirements of Section R402.4.3 without exception.

Removing this exception also does not remove any flexibility with respect to using these products. It simply requires for them to also meet the air leakage requirements which for the reasons stated above is reasonable.

Concerns regarding limits on flexibility can be addressed by making the exception applicable to field fabricated products.

"FENESTRATION PRODUCT, SITE-BUILT. A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems. "

"FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut, or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field fabricated does not include site-built fenestration. "

RE94-13

Final Action: AS AM AMPC____ D

RE95-13
R402.5 (IRC N1102.5)

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com); Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Delete without substitution:

~~**R402.5 (N1102.5) Maximum fenestration U -factor and SHGC (Mandatory).** The area-weighted average maximum fenestration **U-**factor permitted using tradeoffs from Section R402.1.4 or R405 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.~~

Reason:
CONNER: The limits on U-factor and SHGC trade offs reduce flexibility without any compensating energy savings. A decrease in the energy efficiency of the windows through the performance calculation would have to be made up elsewhere leaving the resulting energy efficiency, so the energy result is neutral.

Given the stringency of the newer codes, this section mostly adds a bit of confusion to the code. The statement of a limit on trade offs is sometimes confused with the actual requirement itself (in Table R402.1). There is no need to bulk up the code with even small statements that seldom have any impact.

CULP: By definition, trade-offs are energy neutral, so these mandatory “hard limits” save no energy, but set artificial constraints that limit design flexibility and innovation. Practically speaking, the vast majority of “normal” windows already meet these criteria, so this section has little real impact, and only serves to (a) add confusion between these numbers and the real requirements in Table R402.1.1, and (b) cause compliance problems for unique or special applications.

For example, glass block used in a bathroom remodel:
… it has no label, so use the default U-factor and SHGC
… but the default values do not meet Table R402.1.1, so use a trade-off
… but the default values do not meet the hard limits in this section R402.5, so use area-weighted averaging
… but there is nothing else in the remodel to area-weight average.

So it becomes effectively illegal, even if there are other trade-offs that make the overall remodel even more energy efficient, and the only recourse is to seek a special allowance through the alternative methods provision.

This is just one example. What about special products used in tornado storm shelters that won’t meet the U-factor hard limit? What about vacuum glazing that meets the U-factor and greatly exceeds the required energy efficiency, but not the SHGC hard limit? Do we want to discourage vacuum glazing?

Granted, these are not common situations, but what have we accomplished by creating artificial barriers and extra headaches for code officials and builders? This section should be removed.

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

R402.5-EC-CONNER-CULP

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Maximums U-Factors and SHGC are needed to avoid issues with peak demand and moisture. This is an important “backstop” to assure minimum levels of envelope integrity. These minimums are used widely, and have been for several years.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Dr. Thomas D. Culp, Birch Point Consulting LLC, representing Glazing Industry Code Committee requests Approval as Submitted.

Commenter's Reason: We ask that you overturn the recommendation from the committee for disapproval, which was a split decision, and approve RE95 as-submitted. Much of the discussion at the code hearings has been about how to provide flexibility while upholding energy performance. Section R402.5 is completely counter to that goal and should be removed, as specified in this proposal. Even if you prove equivalent or better energy performance in the performance path, Section R402.5 adds an artificial barrier to the use of certain products and designs.

For the vast majority of "normal" windows this section is not a problem, so this section is not actually doing anything significant, yet it causes compliance problems for unique or special applications. Examples of how Section R402.5 creates compliance problems are given in the original reason statement. Some additional examples include commercial-type entrance doors in the lobby of an apartment building, or fire-rated curtain wall type entrance and stairways in a dormitory. These special applications will typically not meet the basic prescriptive criteria, and even if adjustments are made to the building design to show equivalent or better overall energy efficiency in the performance path, section R402.5 will still prevent them from being installed. The only recourse is to seek use of the alternative means and methods provision, which just creates more work for the code official and delay for the builder.

This section causes problems, does not save any energy, and should be removed. We ask that you vote "NO" on the initial motion for disapproval, and then to vote "YES" on a motion to approve RE95 as-submitted.

Public Comment 2:

Vickie Lovell, Intercode, Inc., representing International Window Film Association requests Approval as Submitted.

Commenter's Reason: Limits on fenestration U-factor and SHGC trade-offs do not promote flexibility and place needless and unfair restrictions on how code compliance can be achieved. It is an impediment to design innovation and opportunities for cutting edge technologies on building components, which is the opposite of promoting whole building energy performance.
More importantly, it causes confusion to designers, code officials and all other users of the code by overcomplicating it. It creates a subset of prescriptive requirements in the performance path which is inappropriate and is not consistent with the intent of the performance objectives of this section of the code.

RE95-13

Final Action: AS AM AMPC____ D

RE96-13
R402.5 (IRC N1102.5)

Proposed Change as Submitted

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

R402.5 (N1102.5) Maximum fenestration *U*-factor and SHGC (Mandatory). The area-weighted average ~~maximum fenestration~~ *U*-factor ~~permitted~~ for vertical fenestration products when complying with this code ~~using trade offs from~~ under Section R402.1.4 or Section R405 shall not exceed the U-factor specified in Table R402.1.1 by more than 25% ~~be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights~~. The area-weighted average U-factor for skylights when complying with this code under Section R402.1.4 or Section R405 shall not exceed the U-factor specified in Table R402.1.1 by more than 25%. The area-weighted average ~~maximum fenestration~~ SHGC ~~permitted~~ for all fenestration products when complying with this code under ~~using trade-offs from~~ Section R405 shall not exceed the SHGC specified in Table R402.1.1 by more than 50%~~in Climate Zones 1 through 3 shall be 0.50~~.

Reason: The purpose of this code change is to modify the requirements and clarify the language related to the maximum U-factor and SHGC for fenestration when using trade-offs for code compliance. This revision improves the energy efficiency and usability of the energy code by ensuring that as prescriptive fenestration efficiency requirements change, the mandatory fenestration maximums (for trade-offs) will automatically adjust as well, specifically by setting the maximum weighted average U-factor at 25% above the prescriptive value and the SHGC at 50% above the prescriptive value. In addition, the revision improves and clarifies the language in the section.

For nearly a decade, the current version of the fenestration U-factor and SHGC maximums in Section R402.5 have provided an effective and critical backstop for fenestration efficiency trade-offs under the Total UA compliance path and the Simulated Performance Alternative. This section ensures that fenestration, which is a crucial element in the thermal envelope, particularly from the standpoint of comfort, as well as condensation, energy efficiency and HVAC sizing, will not be overly weakened by trade-offs.

Unfortunately, as prescriptive fenestration U-factors and SHGC requirements have improved substantially over the last few code change cycles, the fenestration maximums have remained unchanged. For example:

- In the 2006 IECC, the prescriptive SHGC requirement in climate zone 3 was 0.40 and the SHGC maximum in trade-offs was 0.50 (25% higher than the prescriptive value).
- In the 2009 IECC, the prescriptive SHGC requirement was improved to 0.30, but the SHGC maximum remained at 0.50 (67% higher).
- In the 2012 IECC, the prescriptive SHGC requirement was further improved to 0.25, but the SHGC maximum remained at 0.50 (100% higher).

The proposal sets the maximum area-weighted average U-factor 25% higher and the SHGC 50% higher than the prescriptive value, giving a reasonable (but not unlimited) amount of flexibility to the design professional. We chose 25% for U-factor and 50% for SHGC based on judgment after reviewing the resulting values, in recognition that prescriptive U-factors tend to be greater than prescriptive SHGC values, justifying a smaller percentage, and reflecting the need for more flexibility for SHGC due to passive solar concerns. The following table shows the effect of this new proposal on the maximum values for vertical windows:

Climate Zone	Prescriptive U-factor	Maximum U-factor Current	Maximum U-factor Proposed	Prescriptive SHGC	Maximum SHGC Current	Maximum SHGC Proposed
1	NR	NR	NR	0.25	0.50	0.38
2	0.40	NR	0.50	0.25	0.50	0.38
3	0.35	NR	0.44	0.25	0.50	0.38
4	0.35	0.48	0.44	0.40	NR	0.60
5	0.32	0.48	0.40	NR	NR	NR
6 - 8	0.32	0.40	0.40	NR	NR	NR

The proposal also applies a uniform backstop percentage over all climate zones, improving efficiency and simplifying compliance and enforcement in states that stretch across multiple climate zones. The new maximums also allow considerable flexibility for innovative designs such as passive solar, because individual or multiple windows may have significantly higher SHGC or U-factor values, as long as they achieve an area-weighted average value that is within a reasonable range of the prescriptive values.

Because the Total UA and Simulated Performance Alternative compliance options are typically software-based, the change to a percentage-based maximum should require no additional effort on the part of the builder or design professional. Over the long run, this proposal will simplify the code, improve energy efficiency, and add consistency because the maximum will automatically track any change to the fenestration U-factor or SHGC requirements.

The fenestration trade-off limits currently found in the residential chapter of the *IECC* are simple, mandatory measures that ensure all new buildings contain high-quality, cost-effective windows that save energy, provide reasonable comfort, resist condensation in colder climates and block unwanted solar gain in warmer climates. Without the protection of this backstop, fenestration values could be traded away to levels unacceptable in modern building practice. Given the improvements to window efficiency brought about by the 2012 *IECC* and our nation's high priority for energy efficiency, this proposal is a common-sense improvement to an effective code requirement.

- **Simple compliance.** The residential fenestration maximums are effective and easy to understand. These requirements have been successfully applied for the last several years. All states that have already adopted the 2006, 2009, and 2012 *IECC* have adopted these maximums to residential construction. They are also already seamlessly built into compliance software such as the Department of Energy's REScheck.
- **Flexible standard.** The area-weighted average approach embodied in the fenestration maximums allows considerable flexibility for the use of decorative glass, glass block, and other fenestration products, while maintaining a baseline performance for the building's overall glazing. In short, not all products are required to individually meet the maximum values; only the area-weighted average of all products in the building are required to meet the maximum values specified in this code provision.
- **Quality windows, energy savings and peak demand savings nationwide**. The fenestration maximums encourage the use of cost-effective energy-efficient windows nationwide. Because good windows reduce energy consumption both during peak cooling times in the summer months and during peak heating hours in the winter months, such windows help to reduce the strain on the electric grid and natural gas pipeline system and delay the need to build expensive peaking facilities. By reducing the trade-off of efficient windows for other measures, the maximums better capture the benefits of blocking solar gain and providing reasonable insulating value such as peak reduction, reduced cooling system sizes and year-round comfort. Consumers also enjoy the reduced costs that come with economies of scale and market transformation.
- **More comfortable buildings and less energy use.** Incremental changes in window efficiency can have a huge impact on occupant comfort because even the most efficient windows are, at best, still only the equivalent of about an R-3 wall in the winter. Moreover, unlike the opaque wall, even the best fenestration allows substantial summer solar heat gain into the conditioned space. Hot spots created by high solar gain in the summer and/or cold or drafty glass in the winter months can force an occupant to adjust the thermostat to compensate. A good window will provide reasonable insulating value, keeping occupants more comfortable during the coldest months. Similarly, windows with low SHGC will protect against hot spots and occupant discomfort, and will make it less likely that occupants will need to adjust the thermostat and use more energy.

For a more detailed discussion of the benefits of good fenestration, see the section on the benefits of efficient windows on the website of the Efficient Windows Collaborative (a Collaborative of the Alliance to Save Energy, the University of Minnesota, Center for Sustainable Building Research and Lawrence Berkeley National Laboratory, with support from the U.S. Department of Energy) -- http://www.efficientwindows.org/benefits.cfm.

The fenestration maximums have served an important role in ensuring residential energy efficiency for many years. We recommend that the proposed improvements to the fenestration maximums be adopted.

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

R402.5-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent did not demonstrate the technical merits of this proposal in a justifiable manner.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeff Inks, Window & Door Manufacturers Association requests Approval as Submitted.

Commenter's Reason: The variance between the prescriptive fenestration requirements and the trade-off cap limits need to remain consistent from edition to edition of the IECC in order to ensure the code is not inadvertently weakened as the proponents have pointed out.

Establishing the caps as a percentage of the respective prescriptive requirements is a much more sensible approach for ensuring the variance remains consistent than prescribing specific values because it alleviates the need for additional revisions to the cap values when prescriptive requirements are amended.

We also believe the technical merits of this approach are clear and have been clearly demonstrated by the proponent and in addition, that the basis for the proposed variance of 25% for U-factor and 50% for SHGC is sound.

Public Comment 2:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.5 (N1102.5) Maximum fenestration *U*-factor and SHGC (Mandatory). The area-weighted average *U*-factor for vertical fenestration products when complying with this code under Section R402.1.4 or Section R405 shall not exceed 0.40 in climate zones 4 through 8 ~~the U-factor specified in Table R402.1.1 by more than 25%~~. The area-weighted average U-factor for skylights when complying with this code under Section R402.1.4 or Section R405 shall not exceed 0.65 in climate zones 4 through 8 ~~the U-factor specified in Table R402.1.1 by more than 25%~~. The area-weighted average SHGC for all fenestration products when complying with this code under Section R405 shall not exceed 0.40 in climate zones 1 through 3 ~~the SHGC specified in Table R402.1.1 by more than 50%~~.

Commenter's Reason: We recommend approval of RE96 as modified by this public comment. RE96 as modified will bring about a reasonable update to the fenestration maximums that have been in the IECC for many years.
The importance of the current fenestration maximums was recognized by the committee in recommending disapproval of RE95. The committee found: "Maximums U-Factors and SHGC are needed to avoid issues with peak demand and moisture. This is an important "backstop" to assure minimum levels of envelope integrity. These minimums are used widely, and have been for several years." The reason statement for the original RE96 also explains the benefits of the current requirements and the need to update in more detail.

Although we continue to believe that RE96 as submitted would provide long-term benefits by allowing the caps to automatically update whenever fenestration requirements are altered in the IECC, some concern was raised at the committee hearings about the use of a percentage instead of a fixed value. In order to provide additional clarity, we have modified the proposal to establish specific values for specific climate zones, and we have limited the reach of the proposal to only those climate zones covered by the fenestration maximums in the 2012 IECC. The U-factors selected as maximums reflect the prescriptive U-factors already established in milder climate zones (see Table R402.1.1). If a 0.40 U-factor is appropriate and cost effective for warm climate zone 2 in the current IECC, it is reasonable to set 0.40 as a trade-off limit or maximum in the much colder climates of zones 4 – 8. Similarly, if 0.40 SHGC is reasonable in the mixed climate zone 4, it is reasonable to set 0.40 SHGC as a maximum in the cooling-dominated climate zones 1 – 3. It should also be noted that these values are also reasonably consistent with those that would be produced by RE96, as submitted.

Regardless of whether ICC membership favors the original or the modified proposal, we believe that an update to the fenestration maximums is overdue. If the permanent fix provided by the original RE96 is not adopted, we recommend the modifications in this public comment to provide a one-time update to the fenestration maximums.

Public Comment 3:

R. Christopher Mathis, MC2 Mathis Consulting Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.5 (N1102.5) Maximum fenestration U-factor and SHGC (Mandatory). The area-weighted average ~~maximum fenestration~~ building component U-factor and SHGC permitted using tradeoffs from Section R402.1.4 or Section R405 shall not exceed the values in Table R402.5.1. ~~be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.~~

TABLE 402.5.1
Maximum Building Component U-factors and Maximum Fenestration SHGC
When Complying Under Sections R402.1.4 or R405

Climate Zone	Fenestration U-Factor	Fenestration SHGC	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor	Floor U-Factor	Basement Wall U-Factor	Crawlspace Wall U-Factor
1	0.58	0.31	0.86	0.040	0.094	0.227	0.074	0.414	0.549
2	0.46	0.31	0.75	0.035	0.094	0.190	0.074	0.414	0.549
3	0.40	0.31	0.63	0.035	0.066	0.113	0.054	0.105	0.156
4 except Marine	0.40	0.50	0.63	0.030	0.066	0.113	0.054	0.068	0.075
5 and Marine 4	0.37	– -	0.63	0.030	0.066	0.094	0.038	0.058	0.063
6	0.37	– -	0.63	0.030	0.055	0.069	0.038	0.058	0.063
7 and 8	0.37	– -	0.63	0.030	0.055	0.066	0.032	0.058	0.063

Commenter's Reason: Building officials need some assurance that the trades allowed in 402.1.4 and 405 do not result in deficient building envelopes. This modification addresses this need by inserting a simple table defining the allowed limits on envelope trades. This table provides a "backstop" of protection, building upon the protective structure that already exists in R402.5. The proposal also protects against intentional or accidental "gaming" that can occur when seeking compliance via the UA tradeoff or performance path modeling approaches (Sections R402.1.4 and R405, respectively). This proposal provides a simple table of prescriptive envelope performance requirements in a code-familiar structure. It defines maximum allowed limits on envelope components when compliance is sought under R402.1.4 or R405. The maximum component values in the table are based on:

1. A 15% increase in U-factor (reductions in envelope efficiency) versus the 2012 IECC , and
2. A 25% increase in SHGC versus the 2012 IECC (as proposed in RE96).

Why is it important to insert these trading limitations?
The code focus is "***effective use of energy… over the useful life of the building***" (2012 IECC. Sections C101.3 and R101.3.) However, nowhere in this code is this critical code objective – "over the useful life of the building" – addressed.

RE96 (AMPC)-MATHIS
Envelope decisions often remain with the building for the life of the building. Numerous studies have investigated the "useful life" of various residential building materials, components and systems. Data from four such studies has been summarized below for building components relevant to Section 402.5.

Item	DOE Core Data Book[1]	NAHB Report[2]	NIBS Report[3]	ASHRAE Handbook HVAC Applications[4]
Envelope	(Years)	(Years)	(Years)	(Years)
Insulation	100	100	100	-
Windows	40	30	50	-
HVAC				
Furnace, Forced Air	14	17.5	18	18
Unit Heaters, Gas or Electric	15	17.5	13	13
Heat Pump	12	16	15	15
Air Conditioner	-	12.5	-	-
Central Air	11	15	15	15
Window Unit	9	10	10	10
Water Heater, Electric	13	11	14	-
Water Heater, Gas	11	10	12	-

1 U.S. Department of Energy. 2011
Buildings Energy Data Book. D&R International, Ltd. March 2012.
2 National Association of Home Builders. Study of Life Expectancy of Home Components. February 2007
3 U.S. Department of Housing and Urban Development. Residential Rehabilitation Inspection Guide. By the National Institute of Building Sciences. February 2000.
4 "ASHRAE Handbook Heating, Ventilating, and Air-Conditioning Applications", ASHRAE Inc., 2011.

As one can easily see, different building elements have dramatically different life expectancies, especially when considering the 100+ year life expectancy of the home.

Long-lasting building envelope decisions (insulation, windows, air sealing, etc.) define most of the heating and cooling loads of the building. Shorter-lived HVAC systems must then be sized and selected to meet those loads. Even shorter-lived hot water and lighting systems figure into the computer models and should also be weighed against the more durable envelope provisions.

For these reasons it is appropriate to have code requirements that ensure some basic levels of envelope component efficiency when using the tradeoff approaches in R402.1.4 and R405.

Currently, Section R402.5 is the only section providing protection against unreasonable UA or performance modeling trades. This proposal SIMPLIFIES that protection for the whole building envelope, not just the windows. Without such protection the code will continue to treat every building decision as though they have EQUAL life expectancies.

This table provides code officials a simple means to check the values proposed for code compliance under R402.1.4 and R405. These protections in the code are becoming ever more important as computer modeling and rating programs become more the norm for energy code compliance. IF these types of "trades" are to be allowed, they must be informed by our understanding of building product and component life expectancy, and have reasonable limits applied as appropriate. This proposal provides much-needed protection against dumb mathematical trades that MAY work in computer programs, but result in risks to the most basic goal of this code – **"effective use of energy… for the useful life of the building".**

RE96-13

Final Action: AS AM AMPC____ D

RE99-13

R403.1 (IRC N1103.1), R403.1.1 (IRC N1103.1.1), R403.1.2 (IRC N1103.1.2), R403.2.1 (IRC N1103.2.1), R403.2.2 (N1103.2.2), R403.2.3 (IRC N1103.2.3), R403.2.4 (NEW) (IRC N1103.2.4 (NEW)), R403.2.2.1 (IRC N1103.2.2.1), R403.2.6 (NEW), (IRC N1103.2.6 (NEW), Table R405.2(1) (IRC Table N1105.2(1))

Proposed Change as Submitted

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R403.1 (N1103.1) Controls (Mandatory). ~~At least one thermostat shall be provided for each separate heating and cooling system.~~ Heating and cooling system controls shall comply with Sections R403.1.1 through R403.1.3.

R403.1.1 (N1103.1.1) Thermostat (Mandatory). Not less than one thermostat shall be provided for each separate heating and cooling system.

~~R403.1.1 (N1103.1.1)~~ R403.1.2 (N1103.1.2) Programmable thermostat (Mandatory). Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55ºF (13ºC) or up to 85ºF (29ºC). The thermostat shall initially be programmed with a heating temperature set point not higher than 70ºF (21ºC) and a cooling temperature set point not lower than 78ºF (26ºC).

~~R403.1.2 (N1103.1.2)~~ R403.1.3 (N1103.1.3) Heat pump supplementary heat (Mandatory). Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

R403.2 (N1103.2) Ducts. Ducts and air handlers shall be sealed, tested for leakage and insulated in accordance with Sections R403.2.1 through R403.2.~~3~~6.

~~**R403.2.1 (N1103.2.1) Insulation (Prescriptive).** Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.~~

> ~~**Exception:** Ducts or portions thereof located completely inside the *building thermal envelope*.~~

R403.2.1 (N1103.2.1) Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums.

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.

2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.

3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

~~Duct tightness shall be verified by either of the following:~~

1. ~~Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
2. ~~Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.~~

   ~~Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.~~

~~**R403.2.3 (N1103.2.3)Building cavities (Mandatory).** Building framing cavities shall not be used as ducts or plenums.~~

R403.2.3 (N1103.2.3) Duct testing (Mandatory). The ductwork in a building or dwelling unit shall be tested for air leakage. Testing shall be conducted at the rough-in stages or post-construction. Testing for duct leakage shall be at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. Testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and shall be provided to the *code official*.

Exception: Ductwork air leakage testing shall not be required where all ducts and air handlers are located entirely within the *building thermal envelope*.

R403.2.4 (N1103.2.4) Duct leakage (Prescriptive). The total leakage of ducts, where measured in testing accordance with Section R403.2.3, shall meet one of the following requirements:

1. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

2. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

Exception:

~~R403.2.2.1 (N1103.2.2.1)~~ R403.2.5 (N1103.2.5) ~~Sealed~~ Air handler leakage (Mandatory). Air handlers shall have a manufacturer's designation for an air leakage of not more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

R403.2.6 (N1103.2.6) Insulation (Prescriptive). Supply ducts in attics shall be insulated to a *R-value* of not less than R-8. All other ducts shall be insulated to a *R-value* of not less than R-6.

Exception: Ducts or portions of ducts located completely inside the *building thermal envelope* shall not be required to be insulated.

TABLE R405.2(1) (N1105.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	For ducted thermal distribution systems, the duct leakage rate shall be in accordance with Section R403.2.4 and the duct insulation shall be in accordance with Section R403.2.6. For nonducted thermal distribution systems, a distribution system efficiency, DSE, of 0.88 shall be applied to both the heating and cooling system.	Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.

(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change is to make a number of improvements to the provisions of the code related to HVAC system controls and ducts. However, it should be noted that this proposal does not change or tighten required values for tested duct leakage, which were initially set in the 2009 *IECC* and tightened in the 2012 *IECC*. The proposed improvements include:

- Reorganize section R403.1 to clearly specify requirements for controls (no change proposed in substantive requirements for this section).
- Reorganize section R403.2 regarding duct sealing, testing and leakage requirements, including the following substantive changes:
  - Clarify that for required testing, such testing must be conducted by a code official-approved third party; and
  - Convert the duct leakage rate from a mandatory to prescriptive requirement (allowing duct leakage to be traded off under the performance path). Note that testing is still mandatory.
- Revise Table R405.5.2(1) to establish a baseline in the Standard Reference Home for duct leakage/distribution system efficiency. The baseline was incorrectly deleted in 2012.

This proposal maintains the efficiency provided by the improved duct leakage rate set in the 2012 *IECC*, and it improves the transparency and objectivity by requiring that testing be administered by a third party. This proposal also creates a practical solution for situations in which a completed duct system fails the leakage test, by allowing the duct performance shortfall to be offset by other improvements under section R405. This is an important consideration where the on-site testing requirement is already set at a tight level. As a result, this proposal adds flexibility for the builder and increased compliance at no additional energy cost. This proposal also reorganizes the subsections related to systems and ducts to add more clarity and simplicity to the code.

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

R403.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal would require a third party testing agency which is overly restrictive for many communities.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.2.3 (N1103.2.3) Duct testing (Mandatory). The ductwork in a building or dwelling unit shall be tested for air leakage. <u>The maximum total air leakage rate for ducts in any building or dwelling unit under any compliance path shall not exceed 8 cfm (226.5 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.</u> Testing shall be conducted at the rough-in stages or post-construction. Testing for duct leakage shall be at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. <u>Where required by the code official,</u> ~~T~~testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and shall be provided to the *code official*.

> **Exception:** Ductwork air leakage testing shall not be required where all ducts and air handlers are located entirely within the *building thermal envelope*.

R403.2.4 (N1103.2.4) Duct leakage (Prescriptive). The total leakage of ducts, where measured in testing accordance with Section R403.2.3, shall meet one of the following requirements:

1. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.
2. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

> ~~**Exception:**~~

R403.2.5 (N1103.2.5) Air handler leakage (Mandatory). Air handlers shall have a manufacturer's designation for an air leakage of not more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: We recommend approval of RE99 as modified by this public comment. The reason statement for the original RE99 explains the purpose of the original proposed revisions. The proposed modifications in this public comment are intended to address two important issues: (1) the new language will permit the code official to determine whether independent testing is necessary and require it if deemed appropriate (this language is exactly the same as the language that currently applies to air leakage testing in section R402.4.1.2); and (2) the new language will set a mandatory maximum duct leakage of 8 cfm (226.5 L/min) per 100 square feet (9.29 m^2) of conditioned floor area (the level required by the 2009 IECC in section 403.2.2).

The value in allowing the code official to require independent duct testing is self-evident and the same as the value in requiring independent home air leakage testing as the code already does. As for the mandatory maximum, the current IECC sets the mandatory and prescriptive test requirements for duct leakage at the same leakage level – in most cases 4 cfm (226.5 L/min) per 100 square feet (9.29 m^2) of conditioned floor area. Because this value may be difficult to achieve in some cases, we do not object to permitting duct leakage to be traded off, to some degree, in the performance path for other reasonable energy efficiency improvements. However, there should be at least some limits on such trade-offs, particularly given other proposed changes to the performance path. As a result, we propose a mandatory maximum air leakage of 8 cfm be established – this will still leave reasonable room for more flexibility while ensuring some minimum level of performance.

RE99 -13

Final Action: AS AM AMPC____ D

RE106-13
R403.1.2 (IRC N1103.1.2)

Proposed Change as Submitted

Proponent: Eric Makela / Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

R403.1.2 (N1103.1.2) Heat pump supplementary heat (Mandatory). ~~Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.~~ Unitary air cooled heat pumps shall include controls that minimize supplemental heat usage during start-up, set-up and defrost conditions. The controls shall anticipate need for heat and use compression heating as the first stage of heat. The controls shall indicate when supplemental heating is being used through visual means such as a light emitting diode indicator. Heat pumps equipped with supplementary heaters shall be installed with controls that prevent supplemental heater operation at outdoor temperatures greater than 40°F (4.4 °C). The auxiliary heat lock out control shall be set at 35°F (1.7°C)or less at final inspection.

Reason: The current language in the 2012 IECC requiring heat pump thermostats that is fairly general. The language requires a thermostat for heat pumps and includes language that outlines the general intent of the control but does not provide the level of detail needed to enforce the provision. The proposed language provides guidance on what to inspect for to determine of the supplemental heat is on. The proposed language also provides a temperature setpoint for when the supplemental heat is allowed to come on to satisfy the load (40°F). The existing language states that the control must prevent supplemental heat operation when the heat pump can meet the heating load but without a specific temperature threshold the provision is unenforceable. The proposed language is from the Washington State Residential Energy Code and has been field tested.

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

R403.1.2-EC-MAKELA.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This complicates the code needlessly. The existing language is straightforward and understandable.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Submitted.

Commenter's Reason: The current language in the 2012 IECC requiring heat pump thermostats that is fairly general. The language requires a thermostat for heat pumps and includes language that outlines the general intent of the control but does not provide the level of detail needed to enforce the provision. The proposed language provides guidance on what to inspect for to determine if the supplemental heat is on. The proposed language also provides a temperature setpoint for when the supplemental heat is allowed to come on to satisfy the load (≤ 40 °F). The existing language states that the control must prevent supplemental heat operation when the heat pump can meet the heating load but without a specific temperature threshold the provision is unenforceable. The proposed language is from the Washington State Residential Energy Code and has been field tested. Information on auxiliary heat lock out controls can be found at http://www.energy.wsu.edu/documents/AHT_Electric%20Heat%20Lock%20Out%20on%20Heat%20Pumps%20%282%29.pdf

RE106 -13

Final Action: AS AM AMPC____ D

RE107-13
R403.2.1 (IRC N1103.2.1)

Proposed Change as Submitted

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc. smozingo@coloradocode.net

Revise as follows:

R403.2.1 (N1103.2.1) Insulation (Prescriptive). Supply and return ducts in attics shall be insulated to a minimum of R-8. ~~All other ducts~~ Supply and return ducts in other portions of the building shall be insulated to a minimum of R-6.

Exception: Ducts or portions thereof located completely inside the building thermal envelope.

Reason: The requirement as written is commonly misinterpreted to say that all supply ducts in attics are insulated to R-8 and all other ducts in attics, including bathroom exhausts, returns, etc are insulated to R-6 when in fact, the intent was that the supply ducts in attics get R-8 and the supplies in other unconditioned spaces in the building, such as garages, ventilated crawl spaces, etc, get R-6. Also, the ducts should not be limited to supplies but should include return ducts as well. This intent is called out much more clearly in the commercial section of the code.

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

R403.2.1-EC-MOZINGO.DOC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R403.2.1 (N1103.2.1) Insulation (Prescriptive).Supply and return ducts in attics shall be insulated to a minimum of R-8 where 3 inch diameter and greater and R-6 where less than 3 inch diameter. All other ducts supply and return ducts in other portions of the building shall be insulated to a minimum of R-6 where 3 inch diameter and greater and R-4.2 where less than 3 inch diameter.

Committee Reason: This proposed change reflects the original intent of the code that "all other ducts" was meant to mean supply and return ducts, not bathroom exhausts, etc. The modification is to reflect the fact that energy losses in smaller ducts are less.

Assembly Action: **As Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted.

RE116-13
R403.2.2 (IRC N1103.2.2), Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: ~~Total~~ Leakage to the outside of a conditioned space or total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All registers ~~boots~~ shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	<u>Untested distribution systems: DSE = 0.88</u> <u>Tested Ducts: Leakage rate to outside conditioned space as specified Section R403.2.2(1)</u> <u>Tested duct Location: Unconditioned attic</u> <u>Tested duct Insulation: in accordance with Section R403.2.1</u>	~~Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.~~ <u>Untested distribution systems: DSE from Table R405.5.2(2)</u> <u>Tested Ducts: Tested Leakage rate to outside conditioned space</u> <u>Duct Location: As proposed</u> <u>Duct Insulation: As proposed</u>

Reason: Currently there is no guidance in Table R405.5.2(1) on how to model ducts for the Standard Reference Design when performing a simulated energy performance calculation. Consequently, systems which perform better than the code minimum are not recognized in the performance analysis. Proposed changes provide clarity as to what distribution system efficiency should be applied to the Standard Reference Design and how the ducts should be modeled in the performance path.

The default distribution system efficiency (DSE) is set to 0.88 for untested systems in the standard reference design, which is the established default for ducts located in conditioned space. If ductless or hydronic systems are used, a recognized benefit will result in the performance model.

When a duct system is tested, the standard reference tightness is defined in section R403.2.2(1) (4cfm/100ft2 of CFA). Buildings with ducts tighter than the 4cfm/100ft2 will get credit for performing better than the minimum requirement. In addition, the manufacturers of the modeling software will have clear definition how to model the Standard Reference Designincluding duct placement and insulation level.

Changes in section R403.2.2 make it clear that postconstruction duct testing can be tested to either outside conditioned space or total duct leakage, as determined by the contractor.

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

R403.2.2 #2-EC-SURRENA.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal is compatible with previous action on code change proposal no. RE112-13. This proposal also installs the information in Table 405.5.2(1) for tested ducts to relate to the change made in RE109-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy

(ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval

Commenter's Reason: We recommend disapproval of RE116. RE116 should be disapproved because it weakens the current energy efficiency requirements of the IECC related to duct leakage. The IECC currently requires duct tightness to be verified either at rough-in or at post-construction, and in both cases, the test standard is the total leakage of the system. RE116 modifies the test to "leakage to the outside of a conditioned space," but at the same leakage level. This option will result in more total duct leakage than currently permitted, unless the ducts do not leak at all into the occupied conditioned space (a highly unlikely situation unless the ducts are not in conditioned space at all).

Duct systems should be designed (and tested) to verify that conditioned air actually reaches the intended spaces. Tighter duct systems (with low total leakage) will deliver conditioned air where it is supposed to go with minimal leakage to any unintended spaces – conditioned or not conditioned. A test that considers only "leakage to the outside of a conditioned space" could actually be a very inefficient system and result in far more energy usage to condition the space. For example, if an air handler is located inside conditioned space, and the first duct leading from the air handler leaks 20% of the conditioned air into the furnace room, the system may pass the "leakage to outdoors" test, but would certainly fail the "total leakage" test. Moreover, the conditioned air would not get to the intended space, resulting in far more heating and cooling energy being used to achieve the desired temperature and comfort.

RE116 creates an approach that would, in many cases, lead to significant energy losses as compared with the current IECC, and it should be disapproved.

RE116 -13

Final Action: AS AM AMPC____ D

RE119-13
R403.2.3 (IRC N1103.2.3)

<u>Proposed Change as Submitted</u>

Proponent: Dan Buuck, National Association of Home Builders (NAHB) (dbuuck@nahb.org)

Revise as follows:

R403.2.3 (N1103.2.3) Building cavities (Mandatory). Building framing cavities shall not be used as ducts ~~or plenums~~.

Reason: Right now we have a conflict between this section and the IMC and IRC, both of which allow plenums in stud cavities and joist spaces. There is also an apparent conflict within the IECC: It currently allows stud cavity and joist space plenums in residential occupancies more than three stories in height along with all other commercial buildings.

The general prohibition of plenums has also lost its effectiveness in regards to energy savings. When it was approved for the IECC, using stud spaces in exterior walls as plenums was still allowed. That it is now prohibited (see IRC M1601.1.1), so heat loss is not an issue.

During the Group A hearings a proposal to prohibit plenums in the IMC was not successful. The PMG CAC considered this conflict and decided not to support a proposal that would remove language in the IRC that provides guidance on the safe construction of plenums. This would have put the IRC in conflict with the IMC. States are also removing plenums from this section of the IECC as they adopt the 2012 version.

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

R402.2.3-BUUCK.DOC

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The proponent recommended disapproval of this code change proposal.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, National Association of Home Builders, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.2.3 (N1103.2.3) Building cavities (Mandatory). Building framing cavities shall not be used as ducts <u>or as a *plenum* for supply air. Studwall cavities in the outside walls of building envelope assemblies shall not be utilized as air *plenums*.</u>

Commenter's Reason: This public comment reinstates the long-standing practice of using stud and joist spaces as return air plenums. Additional language limiting their location and use was taken from Section M1601 Duct Construction.

Right now we have a conflict between this section and the IMC and IRC mechanical section, both of which allow plenums in stud cavities and joist spaces. There is also an apparent conflict within the IECC: Building cavity plenums are prohibited in one- and two-family homes, but are allowed in multi-family residential occupancies along with all other commercial buildings.

It is important to note that there is no requirement for return ducts/plenums. Returns simply provide an easier path for the air to get back to the air handler, thereby saving energy. So it is only logical to provide an economical solution for a non-required item. This change also allows the use of "jump ducts" which often use building cavities (and are actually *plenums*). Without this change jump ducts are technically not allowed.

The general prohibition of plenums in the energy section has also lost its effectiveness in regards to energy savings. When it was originally adopted in the IECC, using stud spaces in exterior walls as plenums was still allowed in the mechanical section. That it is now prohibited (see IRC M1601.1.1), so heat loss is not an issue. The last sentence of the modification is taken directly from that section.

During the Group A hearings a proposal to prohibit plenums in the IMC was not successful. The PMG CAC considered this conflict and decided not to support a proposal that would remove language in the IRC that provides guidance on the safe construction of plenums. This would have put the IRC in conflict with the IMC. States are also removing plenums from this section of the IECC as they adopt the 2012 version.

RE119 -13

Final Action: AS AM AMPC____ D

RE120-13
R403.2.3 (IRC N1103.2.3)

<u>Proposed Change as Submitted</u>

Proponent: Brenda A. Thompson, Clark County Building Department, Las Vegas NV, representing the ICC Sustainability, Energy & High Performance Code Action Committee (SEHPCAC)

Revise as follows:

R403.2.3 (N1103.2.3) Building cavities (Mandatory). Building framing cavities <u>in the *building thermal envelope*</u> shall not be used as ducts or plenums.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal revises Section R403.2.3 to align with the requirements of Section M1601.1.1 of the IRC and Section 602.3 of the IMC, which prohibit building framing cavities in exterior walls to be used as ducts or plenums, but allow framing cavities in interior walls to be used as ducts or plenums. As currently configured these code sections conflict with one another and make enforcement confusing and difficult.

The current language in Section R403.2.2 of the IECC does not allow building cavities in interior walls or floors to be used as ducts. While this section would not prevent such interior walls or floors to be used as ducts or plenums, Section 602.3 of the IMC and Section M1601.1.1 prohibit their use as supply ducts. Therefore, these interior wall and floor building cavities would ultimately be permitted to be used only as return ducts.

Note that the IECC defines *building thermal envelope* as "The *basement walls, exterior walls*, floor, roof and any other building element that enclose *conditioned space* or provides a boundary between *conditioned space* and exempt or unconditioned space."

Also note that, while the *building thermal envelope* is an energy issue, ducts are a mechanical issue and are governed primarily by the IMC and the mechanical chapters of the IRC.

Cost Impact: The code change proposal will decrease the cost of construction.

R403.2.3-EC-THOMPSON-SEHPCAC.DOC

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: There is no way to effectively test building cavities. Returns are especially problematic. A full return without leakage is necessary to protect the integrity of the combustion air zone.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.2.3 (N1103.2.3) Building cavities (Mandatory). Building framing cavities ~~in~~ <u>which are part of the assemblies establishing</u> the *building thermal envelope* shall not be used as ducts or plenums.

Commenter's Reason: The Residential IECC Code Development committee disapproved this proposal and other similar proposals on the grounds that it is difficult to test such cavities when used as ducts and plenums. The proposal is modified to clarify that those cavities that are part of the assemblies that comprise the building thermal envelope would still be prohibited to be ducts and plenums, but those inside of the envelope – interior walls and interior floor/ceilings could be used. Those assemblies are not subject to the testing – the testing is for the thermal envelope.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RE120 -13

Final Action: AS AM AMPC____ D

RE122-13

R403.4 (IRC N1103.4), R403.4.3 (NEW) (IRC N1103.4.3 (NEW)), Table R403.4.3 (NEW) (IRC Table N1103.4.3 (NEW))

Proposed Change as Submitted

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self. (eosann@nrdc.org)

Revise as follows:

R403.4 (N1103.4) Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1, ~~and~~ R403.4.2 and R403.4.3.

R403.4.3 (N1103.4.3) Hot water pipe volume (Mandatory). In a service hot water distribution system, the volume in the piping between the end of a hot water fixture supply and the piping connection to a hot water source shall not exceed 0.5 gallon (1.9 liters). The hot water source shall be a recirculating system pipe, a heat-traced pipe or a water heater. The volume in the piping shall be calculated using the values in Table R403.4.3.

TABLE R403.4.3 (N1103.4.3)
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

	LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING							
Nominal Size (Inches)	**Copper Type M**	**Copper Type L**	**Copper Type K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**PEX-AL-PEX ASTM F 1281**	**PE-AL-PE**	**PEX CTS SDR 9**
⅜	1.06	0.97	0.84	N/A	1.17	0.63	0.63	0.64
½	1.69	1.55	1.45	1.25	1.89	1.31	1.31	1.18
⅝	2.49	2.31	2.22	N/A	N/A	2.12	2.12	1.72
¾	3.43	3.22	2.90	2.67	3.38	3.39	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	5.56	5.56	3.91
1¼	8.70	8.36	8.09	6.61	9.66	8.49	8.49	5.81
1½	12.18	11.83	11.45	9.22	13.20	13.88	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	21.48	21.48	13.86

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons,
0.5 gallon (1.9 liters) = 64.0 liquid ounces

Reason: Cold or tepid water in the initial draw from a hot water outlet is often unusable for its intended purpose, and is frequently purged, resulting in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the shower sooner. However, a complementary strategy is to reduce the volume of water contained in the hot water distribution system in the first place.

This proposal, which is comparable to the criteria adopted by the US EPA WaterSense for New Homes specification in 2009, establishes a maximum volume of 0.5 gallons for water in a hot water supply line, based on internal volumes specific to the piping material. By allowing the volume limitation to be computed from runs from recirculation loops, this provision allows designers additional flexibility while effectively limiting the amount of water to be purged to ½ gallon per draw.

The proposal designates this provision as mandatory. The reason for this is that while the 2012 IECC performance approach allows credit for improving the efficiency of the hot water heat source, no credit is available for features of the hot water distribution system that might actually reduce the amount of hot water used, such as a limitation on hot water supply pipe volume Thus, even though this design criterion will save significant amounts of energy over the life of the building, its energy savings cannot be "scored" or accumulated within the performance framework of the code. If designated "prescriptive", it is likely to be ignored by builders using the performance path since it cannot contribute to compliance under the IECC performance approach. Thus, "mandatory" is the better approach at this time. If and when Section R405 is modified to ensure that the performance path will account for the energy attributes of the hot water distribution system, consideration can be given to removing the mandatory designation from this proposed section.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

R403.4.2-EC-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal would require that plumbing plans (water distribution system plumbing) be submitted for every project. Isn't there a simpler way? This would be too difficult for an inspector to check. This could also have the unintended consequence of making designers install additional water heaters.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council, representing self; Harry Misuriello, American Council for an Energy-Efficient Economy; Brian Dean, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc. request Approval as Modified by this Public Comment

Modify the proposal as follows:

R403.4 (N1103.4) Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1, R403.4.2 and R403.4.3.

R403.4.3 (N1103.4.3) Hot water pipe volume (Mandatory). ~~In a service hot water distribution system, the volume in the piping between the end of a hot water fixture supply and the piping connection to a hot water source shall not exceed 0.5 gallon (1.9 liters).~~ The volume of water in a service hot water system between the termination of a supply pipe to individual fixtures indicated in Section R403.4.3.1 and the nearest source of hot water shall not exceed 128 ounces (3.8 liters). The hot water source shall be a recirculating system pipe, a heat-traced pipe or a water heater. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds located between the heat source and the fixture supply pipe termination. The volume in the piping shall be calculated using the values in Table R403.4.3. Calculation of the internal volume of plumbing appurtenances and piping materials or dimensions not included in Table R403.4.3 shall be documented and *approved*.

R403.4.3.1 (IRC N1103.4.3.1) Scope. The volume limitation in Section P2904.1 shall apply to hot water supplied to all of the following fixtures:

1. lavatories
2. kitchen sinks
3. showers
4. tub-showers

TABLE R403.4.3 (N1103.4.3)
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

	LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING								
Nominal Size (Inches)	**Copper Type M**	**Copper Type L**	**Copper Type K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**CPVC SCH 80**	**~~PEX-AL-PEX~~ Composite ASTM F 1281**	**~~PE-AL-PE~~**	**PE-RT SDR 9**	**PEX CTS SDR 9**
⅜	1.06	0.97	0.84	N/A	1.17	N/A	0.63	~~0.63~~	0.64	0.64
½	1.69	1.55	1.45	1.25	1.89	1.46	1.31	~~1.31~~	1.18	1.18
~~⅝~~	~~2.49~~	~~2.31~~	~~2.22~~	~~N/A~~	~~N/A~~		~~2.12~~	~~2.12~~		~~1.72~~
¾	3.43	3.22	2.90	2.67	3.38	2.74	3.39	~~3.39~~	2.35	2.35
1	5.81	5.49	5.17	4.43	5.53	4.57	5.56	~~5.56~~	3.91	3.91
1¼	8.70	8.36	8.09	6.61	9.66	8.24	8.49	~~8.49~~	5.81	5.81
1½	12.18	11.83	11.45	9.22	13.20	11.38	13.88	~~13.88~~	8.09	8.09
2	21.08	20.58	20.04	15.79	21.88	19.11	21.48	~~21.48~~	13.86	13.86

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons,

~~0.5~~ 1 gallon (~~1.9~~ 3.8 liters) = ~~64.0~~ 128 liquid ounces

Commenter's Reason: In response to the committee's concern that a simpler approach be found, the modification in this public comment simplifies and clarifies the original proposal in the following ways:

- Limits the applicability of the proposal to hot water piping serving three types of fixtures:
  - Showers and tub-shower combinations.
  - Kitchen sinks.
  - Lavatories.
- Increases the maximum volume permitted within a hot water supply pipe to any individual fixture to 1 gallon (128 ounces), up from ½ gallon in the original proposal.
- Conforms the table of internal volumes for various types and diameters of piping material to the values in Table E202.1 of the International Plumbing Code as approved for 2015.
- Clarifies that the permissible volume of water is to be calculated from the "nearest" source of hot water to an "individual" fixture.
- Adds a sentence to clarify the inclusion of the internal volume of valves, manifolds, and similar devices that may be located on hot water piping between the nearest heat source and the termination of the supply pipe at a fixture.
- Adds a sentence to allow calculation of the internal volume of plumbing appurtenances such as manifolds and pipe materials or dimensions that are not included in the table, with documentation satisfactory to the code official.

The initial purging of cooled-down hot water that is insufficiently hot for its intended purpose results in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the user sooner. However, a complementary strategy is to reduce the volume of water contained in hot water piping in the first place.

A 2009 paper authored by Robert Hendron of the National Renewable Energy Laboratory and others[a] quantified the waste of hot water in initial draws waiting for water to reach 105ºF. Modeling the plumbing typical of a 3-bedroom, 2-bath, single-story home with a hot water distribution simulation tool found that an estimated 12 % of all hot water used on an annual basis is wasted. When viewed by fixture, the results are even more instructive:

- Showers – over 10 % wastage.
- Kitchen sinks – 18 % wastage.
- Lavatories – over 30 % wastage.

Purging at these fixtures is responsible for 95 % of the estimated total of nearly 3,000 gallons of hot water wastage annually. Of course, many new homes are built with more hot water outlets than this model's base case, and hot water distribution systems that are far less efficient. Nevertheless, this revision to RE122 will direct the attention of designers, installers, and code officials to the piping of fixtures that are responsible for most hot water waste.

The table in the proposal is simply a computational aid, to provide a handy, standardized reference for determining the volume of water per linear foot of pipe. The internal diameters of various types of piping material are different enough that including specific values for each type of pipe material is useful, helping designers find the desired combination of pipe length and permissible volume. Modifications to the table in this comment are simply to conform the Table to the values and materials already accepted for Table E202.1 in the IPC. Code officials we consulted viewed the table as helpful for inspection purposes as well.

The committee's final stated reason for disapproval, that this proposal *could* [emphasis added] make designers install multiple water heaters, is speculation. The proposal sets a maximum volume of water in hot water supply piping between a heat source and a shower, lavatory, or kitchen sink. This limit can be achieved with attention to water heater placement and piping layout at the design stage, and need not require multiple water heaters. The downsizing of pipe diameters and the substitution of piping materials with smaller internal diameters are additional strategies available to designers and installers. Reducing pipe length, reducing pipe diameter, and substituting composite piping material with smaller internal diameter each have the effect of reducing installation costs. And the designation of a recirculation system pipe as a heat source for purposes of calculating permissible hot water volume offers additional design flexibility for homes employing a recirculation system, an option often preferable to an additional water heater in a large home and likely to become more energy-efficient with the approval of RE125 as recommended by the committee.

[a]Hendron, Robert, el al. "Potential for Energy Savings through Residential Hot Water Distribution System Improvements", Proceedings of the 3rd International Conference on Energy Sustainability, San Francisco, CA, July 2009.

RE122-13

Final Action: AS AM AMPC____ D

RE123-13
R202 (IRC N1101.9), R403.4 (IRC N1103.4), R403.4.1 (NEW) (IRC N1103.4.1 (NEW)), Chapter 5

Proposed Change as Submitted

Proponent: Meg Waltner, Natural Resources Defense Council (mwaltner@nrdc.org)

Revise as follows:

R403.4 (N1103.4) Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1 ~~and R403.4.2~~, R403.4.2 and R403.4.3.

R403.4.1 (N1103.4.1) Water heating equipment (Prescriptive). This section shall apply only to buildings in climate zones 1 through 5. *Service water heating* equipment shall be of one or more of the types in the following list. Where replacement of existing *service water heating* equipment is required and the replacement equipment is of the same type as the existing, the replacement shall be have an efficiency that is the same or better than the existing equipment. Where existing equipment is replaced with another type of *service water heating* equipment, the equipment shall be of one or more of the types in the following list.

1. a *desuperheater water heater* listed and labeled to AHRI 470
2. a heat pump water heater a heat pump water heater with an energy factor, EF, of 2.0 or greater
3. a solar water heating system having a solar system heating fraction of 0.50 or greater
4. an instantaneous water heater
5. a fuel-gas fired storage water heater with energy factor, EF, of 0.67 or greater

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

DESUPERHEATER WATER HEATER. A factory-made assembly of elements by which the flows of refrigerant vapor and water are maintained in a heat transfer relationship so that the refrigerant vapor is desuperheated and the water is heated.

Add new standard to Chapter 5 as follows:

AHRI

470-06 Performance Rating of Desuperheater/Water Heaters

Reason: As shown in the attached analysis prepared by the Department of Energy, there are cost effective ways to achieve significant energy savings in service water heating systems in climate zones 1-5 compared to standard-efficiency storage electric and fuel-fired heaters. The proposed change offers multiple options for compliance with the new requirement. Cost-effective measures should be included in the IECC as a measure of sound energy policy and to protect consumers from unnecessarily high future energy costs.

Water Heaters

Description

Residential envelopes have been getting tighter and better over the last few years. As a result, domestic water heating energy is emerging as a significant end-use from the efficiency stand-point. There are multiple ways of improving the efficiency of generating hot water in homes. DOE analyzed some of the more common methods – for homes with gas water heaters, water heaters with Energy factor (EF) greater than the federal minimum baseline and tankless water heaters are analyzed; for homes with electric water heaters, heat-pump water heaters are analyzed. Desuperheaters are analyzed for all cases.

The Life Cycle cost analysis uses the DOE Cost Effectiveness Methodology[1] for assessing cost effectiveness. This analysis has been carried out for the single family prototype, for 15 locations, one foundation type and one heating system except the heat pump water heater analysis which is carried out for homes with electric resistance and heat pump space heating. Table 1 indicates the location cost indices provided by Faithful and Gould (2011)[1] used to reflect local construction costs. Recent residential fuel prices specific to each location summarized in Table 2 are used for energy cost calculations. These have been obtained from the DOE Energy Information Administration.[2,3]

Table 1: Cost multipliers by State

Location	State	Climate Zone	Moisture Regime	multiplier
Miami	FL	1	moist	0.884
Phoenix	AZ	2	dry	0.928
Houston	TX	2	moist	0.837
El Paso	TX	3	dry	0.837
San Francisco	CA	3	marine	1.142
Memphis	TN	3	moist	0.863
Albuquerque	NM	4	dry	0.903
Salem	OR	4	marine	1.038
Baltimore	MD	4	moist	0.956
Boise	ID	5	dry	0.918
Chicago	IL	5	moist	1.069
Helena	MT	6	dry	0.936
Burlington	VT	6	moist	0.933
Duluth	MN	7	moist	1.06
Fairbanks	AK	8	moist	1.336

High efficiency gas storage water heaters

This concept looks at the energy savings potential of high efficiency storage water heater. The residential prototype is presently equipped with a 40 gallon hot water heater. Federal minimum efficiency requirements were revised in 2010 and compliance with the required standards for water heaters is required from April 2015. The new rule requires 40 gallon gas storage water heaters to have an EF of 0.615[2]. An EF of 0.67 is analyzed in this concept.

Table 2: Fuel Costs by State

Location	State	Climate Zone	Moisture Regime	Electricity-winter ($/kWh)	Electricity-summer ($/kWh)	Gas ($/thm)	Oil ($/MBtu)
Miami	FL	1	moist	0.117	0.117	1.532	23.7
Phoenix	AZ	2	dry	0.099	0.117	1.306	23.7
Houston	TX	2	moist	0.11	0.12	0.814	23.7
El Paso	TX	3	dry	0.11	0.12	0.814	23.7
San Francisco	CA	3	marine	0.149	0.156	0.943	23.7
Memphis	TN	3	moist	0.095	0.095	0.862	23.7
Albuquerque	NM	4	dry	0.099	0.116	0.791	23.7
Salem	OR	4	marine	0.091	0.092	1.174	23.7
Baltimore	MD	4	moist	0.134	0.151	1.039	23.7

[1] Faithful + Gould. 2011. *Residential Energy Efficiency Measures – Locations Factors*. Portland, Oregon. http://bc3.pnnl.gov/wiki/index.php/Downloads

[2] http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/htgp_finalrule_fedreg.pdf

Boise	ID	5	dry	0.078	0.084	0.869	23.7
Chicago	IL	5	moist	0.108	0.122	0.717	23.7
Helena	MT	6	dry	0.091	0.096	0.795	23.7
Burlington	VT	6	moist	0.158	0.155	1.433	23.13
Duluth	MN	7	moist	0.103	0.108	0.833	23.7
Fairbanks	AK	8	moist	0.166	0.171	0.839	23.7

Energy Cost Savings

Figure 1 below shows energy cost savings for each climate zone.

Cost Effectiveness

The cost for high efficiency water heaters were derived from the Technical Support document and Life Cycle Cost (LCC) spreadsheets for the Appliance Standards rule-making for water heaters[3][4]. These costs are blended for retrofits and new construction. To generate costs specific to new construction alone, the Crystal Ball (CB) analysis was re-run with the fractions set to 100% new construction and 0% retrofits.

The total installed cost for a 40 gallon gas storage water heater with EF 0.62 works out to $1609 while the total installed cost for a 40 gallon gas storage water heater with EF 0.67 works out to $1468. This unexpected drop in costs is due to lower venting costs associated with the high efficiency water heater. The baseline requires natural draft venting which has higher costs than the plastic power venting apparatus required by the high efficiency water heater.

It can be concluded that using a higher efficiency water heater not only saves energy during its life, but also costs less to install. This measure is thus, cost-effective.

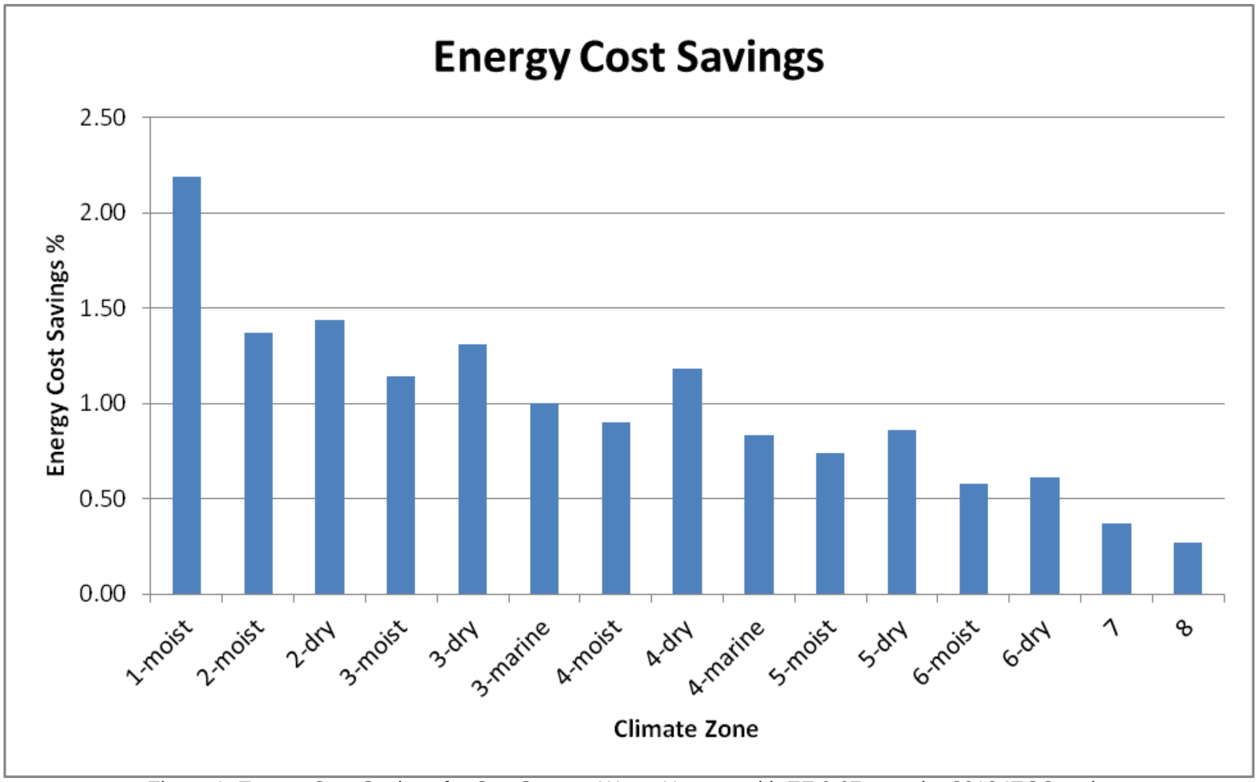


Figure 1: Energy Cost Savings for Gas Storage Water Heaters with EF 0.67 over the 2012 IECC code

[3] http://www1.eere.energy.gov/buildings/appliance_standards/residential/heating_products_fr_tsd.html

[4] http://www1.eere.energy.gov/buildings/appliance_standards/residential/heating_products_fr_spreadsheets.html

Tankless Water Heaters

The most common type of water heaters in residences are storage type. Stand-by losses are associated with storage tank water heaters because hot water draws are inconsistent in homes. This concept looks at tankless type of water heaters, which eliminate the stand-by losses almost entirely. Tankless water heaters have a small storage tank, usually 1 gallon, which has a small associated stand-by loss. Tankless water heaters with an Energy Factor (EF) of 0.82, which is the minimum EF for EnergyStar tankless water heaters[5], are analyzed in this concept.

There is some evidence that instantaneous water heaters don't perform at their rated efficiency when subjected to realistic hot water draw profiles, i.e., shorter draws that occur frequently during a typical day in residences. To account for this reduction in performance, the assumed EF of instantaneous water heaters is reduced to 92% of its value[6].

Energy Cost Savings

Figure 2 below shows energy cost savings for each climate zone.

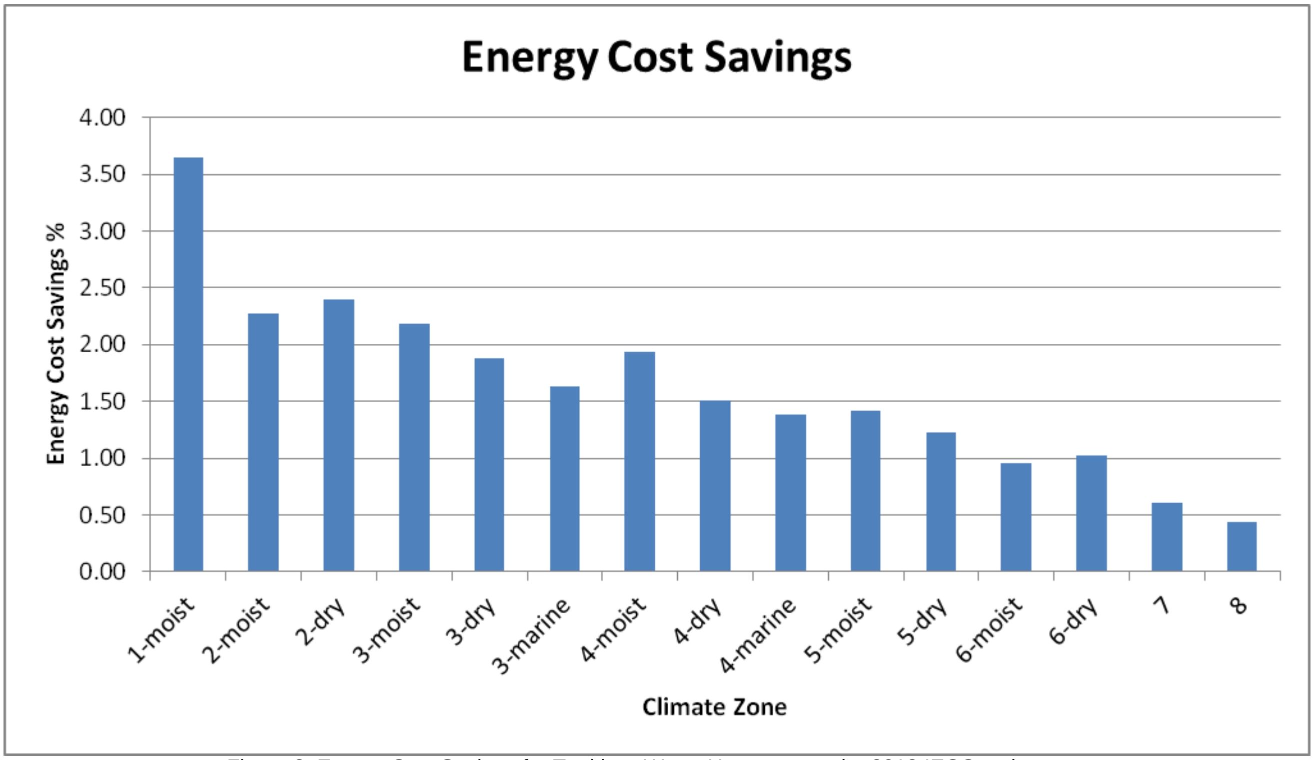


Figure 2: Energy Cost Savings for Tankless Water Heaters over the 2012 IECC code

Cost Effectiveness

The costs for gas fired instantaneous water heaters are derived from the Technical Support document and Life Cycle Cost (LCC) spreadsheets for the Appliance Standards rule-making for water heaters. These costs are blended for retrofits and new construction. To generate costs specific to new construction alone, the Crystal Ball (CB) analysis was re-run with the fractions set to 100% new construction and 0% retrofits.

The total installed cost for a 40 gallon gas storage water heater with EF 0.62 works out to $1609 while the total installed cost for a gas fired instantaneous water heater with EF 0.82 works out to $2376. Figure 3 below shows the Life Cycle Cost for this measure across all climate zones. Tankless water heaters turn out to be cost effective in the warmer climate zones but not so much as we move to the colder climate zones.

[5] EnergyStar website http://www.energystar.gov/index.cfm?c=water_heat.pr_crit_water_heaters
[6] RESNET reduction factor for the EF of instantaneous water heaters

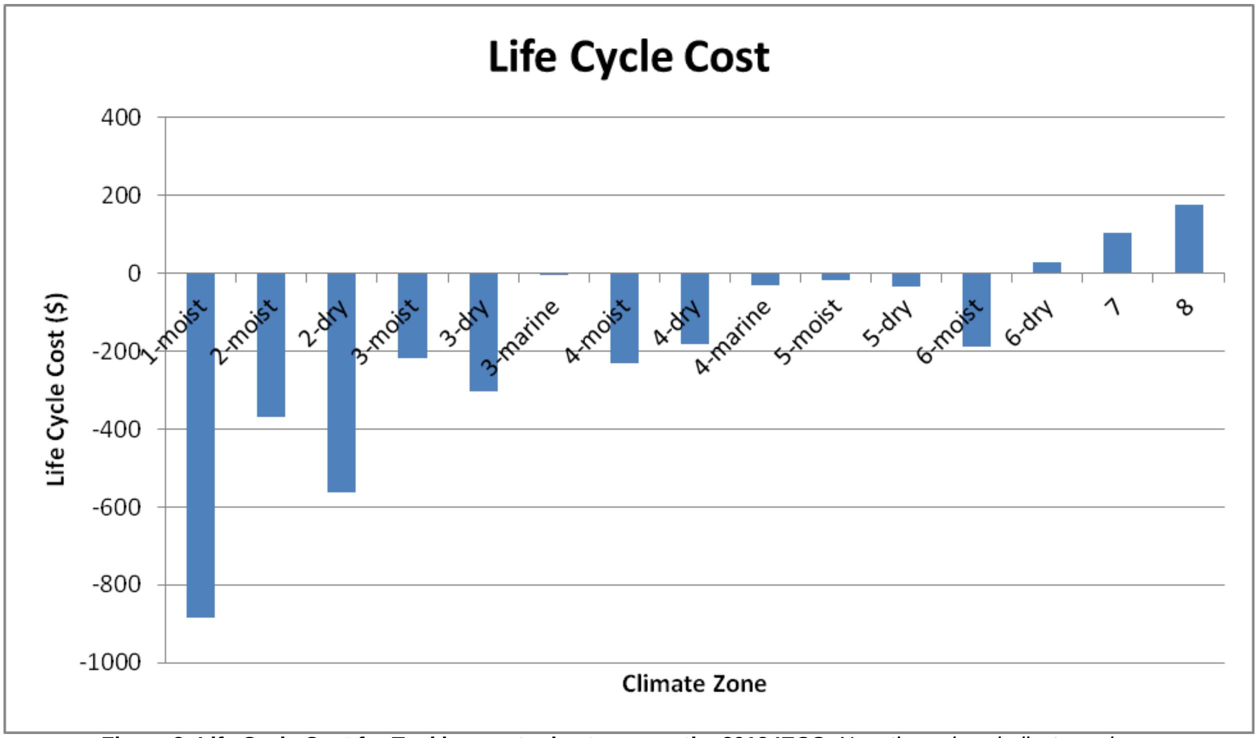


Figure 3: Life Cycle Cost for Tankless water heaters over the 2012 IECC. *Negative values indicate savings*.

Heat-Pump Water Heaters

Heat-Pump water heaters (HPWH) combine the elements of a heat-pump and a water heater. HPWHs extract heat from the surrounding space and use it to heat water. As a result, they provide the dual benefit of cooling a space while providing the required hot water. DOE considered a HPWH with EF 2.0 for this concept.

The HPWH is assumed to be located inside the conditioned living space. Water heaters are usually placed in unconditioned garages or in closets inside a conditioned space. In order to perform effectively, HPWHs require sufficient surrounding space for heat exchange which may not always be available within a conditioned space. Due to the nature of HPWHs, they perform much better within conditioned spaces in cooling dominated climates. HPWHs are simulated in all climate zones in this analysis.

Energy Cost Savings

Figure 4 below shows energy cost savings for each climate zone.

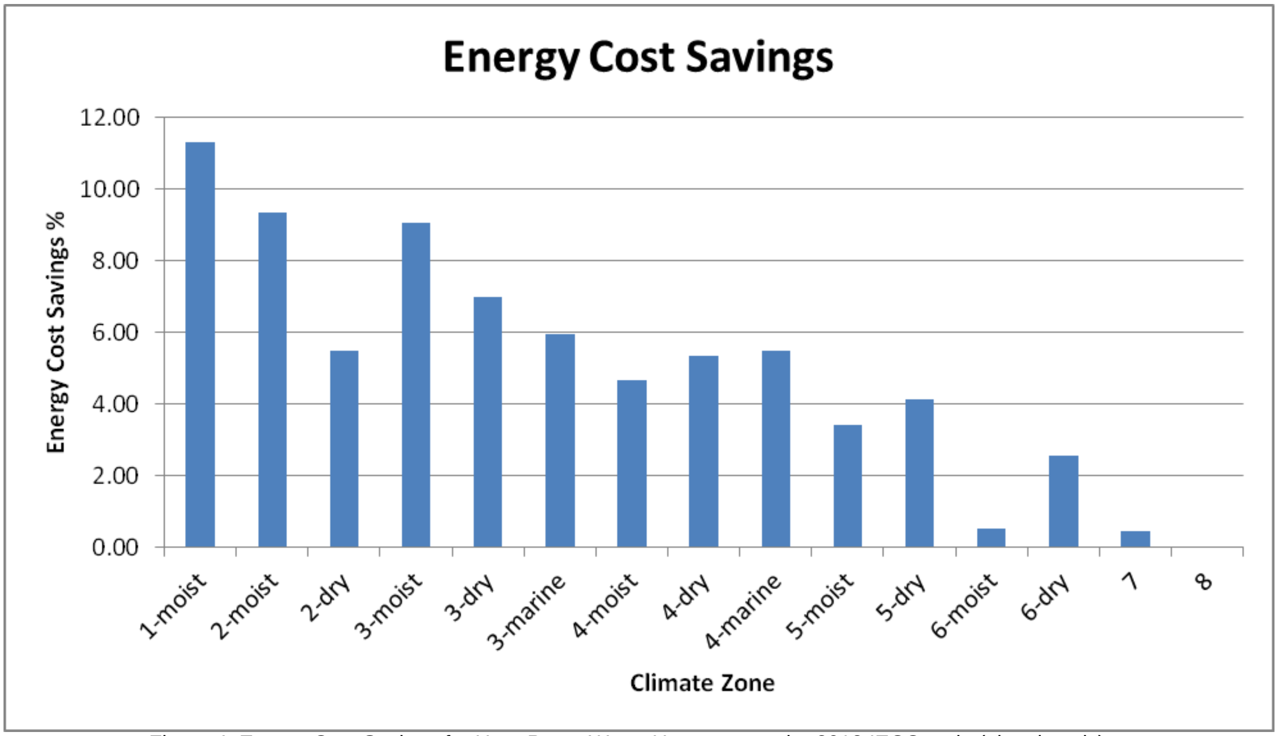


Figure 4: Energy Cost Savings for Heat-Pump Water Heaters over the 2012 IECC code (electric only)

Cost Effectiveness

The cost for high efficiency water heaters were derived from the Technical Support document and Life Cycle Cost (LCC) spreadsheets for the Appliance Standards rule-making for water heaters. These costs are blended for retrofits and new construction. To generate costs specific to new construction alone, the Crystal Ball (CB) analysis was re-run with the fractions set to 100% new construction and 0% retrofits.

According to this data, the installed cost of 40 gallon Electric Storage Water Heaters with EF 0.95 is $688 and that of an EF 2.35 Heat Pump Water Heater is $1697. State cost multipliers from table 2 are used to generate incremental costs by state. Figure 5 below shows the Life Cycle Cost Savings from this measure. According to our analysis, Heat-Pump water heaters in place of electric storage water heaters are cost effective in all zones.

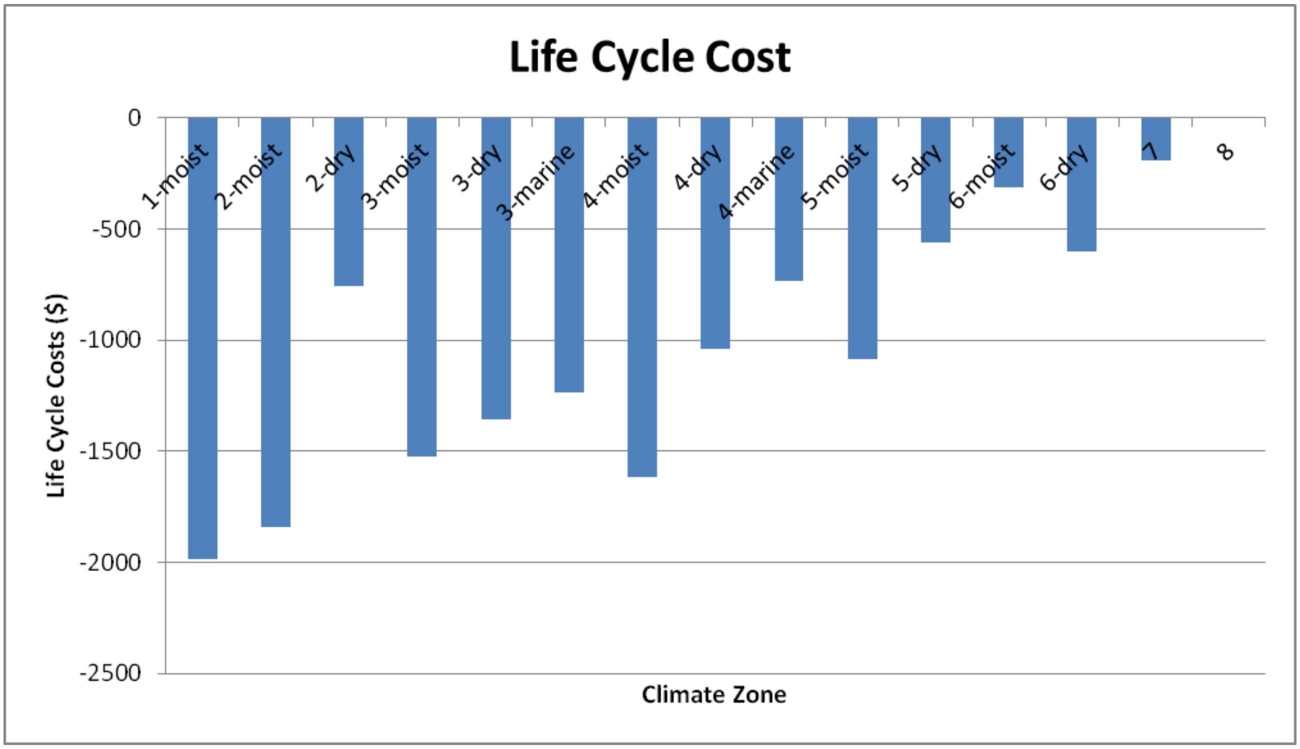


Figure 5: Life Cycle Cost for the concept over the 2012 IECC. *Negative values indicate savings*.

Desuperheaters

During summer operation, the heat removed from the refrigerant would normally be rejected to the atmosphere. Using this heat in the hot water system, therefore, results in significant energy savings because hot water heating is performed at a reduced energy input (greatly reduced in some cases). Heat supplied to the water during winter operation (in the heating season) is not "free" as in the cooling mode, because that heat would normally be used to satisfy space heating demands. However, energy savings are possible because the water heating takes place at an advantageous coefficient of performance (COP).

Energy Cost Savings

Figure 6 below shows energy cost savings for each climate zone. Desuperheaters are most effective for cooling dominated climate zones as it operates only when the air conditioner is running. Hence the expected the energy savings are much higher for CZ 1-3, with decreasing savings for the colder climate zones.

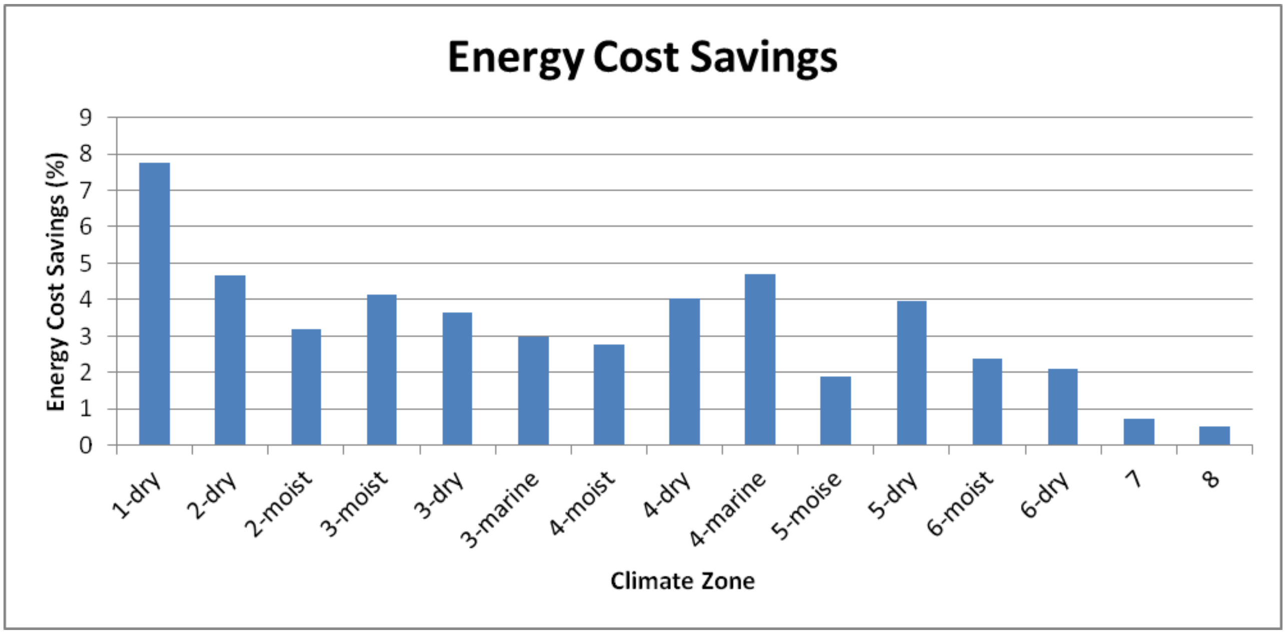


Figure 6: Energy Cost Savings over the 2012 IECC code for Desuperheaters

Cost Effectiveness

Data available online documents the cost of equipment at $500 with installation costs ranging from $500-$1000.[7] [8] An incremental cost of $1250 has been assumed for both equipment and installation.

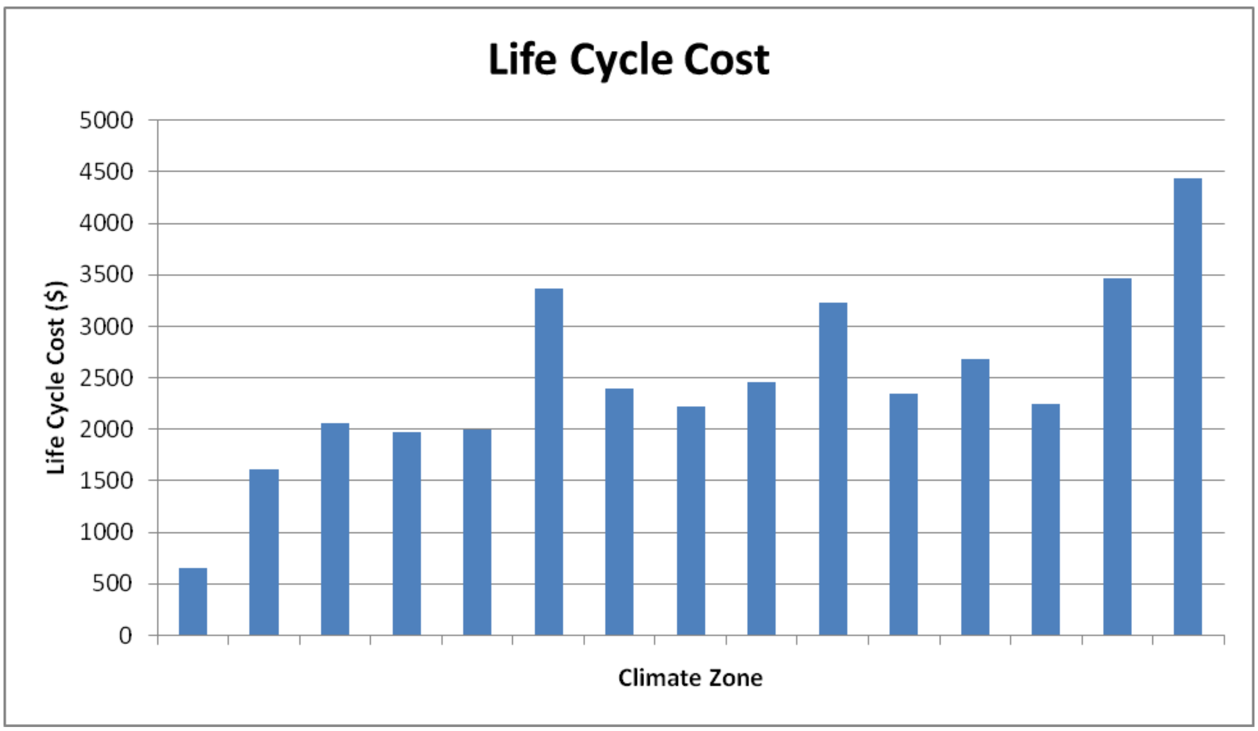


Figure 7: Life Cycle Costs over the 2012 IECC code for Desuperheaters

[7] http://bc3.pnnl.gov/wiki/index.php/Desuperheaters_(0004)
[8] NW Council Cots on Desuperheaters. August 2008, Regional Technical Forum.

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

Analysis: A review of the standards proposed for inclusion in the code, AHRI 470 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This code change would inappropriately limit products that can be used for service water heating. This would stifle innovation.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Meg Waltner, Natural Resources Defense Council (NRDC) representing the Natural Resources Defense Council (NRDC) (dgoldstein@nrdc.org) requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.4.1 (N1103.4.1) Water heating equipment (Prescriptive). This section shall apply only to buildings in climate zones 1 through 5. ~~*Service water heating* equipment shall be of one or more of the types in the following list.~~ The entire hot water demand for a building shall be provided by one or more National Appliance Energy Conservation Act-compliant water heaters assisted by a *desuperheater water heater* listed and labeled to AHRI 470 or assisted by a solar water heating system having a solar system heating fraction of not less than 0.50 or greater.

Where ~~replacement of~~ any equipment portion of an existing *service water heating* ~~equipment~~ system is ~~required~~ replaced and the replacement equipment ~~is of the same type as the existing~~ utilizes the same fuel type as the replaced equipment, the replacement equipment shall ~~be~~ have an efficiency that is the same or ~~better~~ greater than the ~~existing~~ equipment replaced. Where any equipment portion of an existing ~~equipment is replaced with another type of~~ *service water heating* system is replaced with ~~the~~ equipment utilizing a different fuel type, the end result shall be that the entire hot water demand for the building shall be ~~of one or more of the types in the following list~~ provided by one or more National Appliance Energy Conservation Act-compliant water heaters assisted by a *desuperheater water heater* listed and labeled to AHRI 470 or assisted by a solar water heating system having a solar system heating fraction of not less than 0.50 or greater.

A hot water storage tank shall be provided for solar water heating systems except where the solar water heating system can utilize the storage tank of another type of water heater in the *service water heating* system.

> **Exception:** The requirement for National Appliance Energy Conservation Act-compliant water heaters assisted by a desuperheater water heater or assisted by a solar water heating system to shall not apply where the entire hot water demand for a building is provided by one or more of the following:
>
> ~~1. a *desuperheater water heater* listed and labeled to AHRI 470~~
> ~~2.~~ 1. ~~a heat pump water heater~~ a heat pump water heater with an energy factor, EF, of 2.0 or greater
> ~~3.~~ 2. a solar water heating system having a solar system heating fraction of ~~0.50~~ 1.0 ~~or greater~~
> ~~4.~~ 3. an instantaneous water heater
> ~~5.~~ 4. a fuel-gas fired storage water heater with energy factor, EF, of 0.67 or greater

Commenter's Reason: This modification revises the proposal to clearly state that the primary requirement is for the installation of any NAECA compliant water heater in combination with one of two measures that will enhance energy savings: a desuperheater water heater or a solar hot water heater. This will allow for and encourage innovation both by allowing for the installation of any water heater type and by encouraging the development and use of two technologies in combination with a water heater that increase energy savings. It also provides for exceptions to this primary option if other, higher efficiency, water heating options are installed.

As it is difficult to read through strike-out and underlined text, the resultant code text will be as follows:

R403.4.1 (N1103.4.1) Water heating equipment (Prescriptive). This section shall apply only to buildings in climate zones 1 through 5. The entire hot water demand for a building shall be provided by one or more National Appliance Energy Conservation Act-compliant water heaters assisted by a *desuperheater water heater* listed and labeled to AHRI 470 or assisted by a solar water heating system having a solar system heating fraction of not less than 0.50.

Where any equipment portion of an existing *service water heating* system is replaced and the replacement equipment utilizes the same fuel type as the existing equipment, the replacement equipment shall have an efficiency that is the same or greater than the equipment replaced. Where any equipment portion of an existing *service water heating* system is replaced with equipment utilizing a different fuel type, the end result shall be that the entire hot water demand for the building shall be provided by one or more National Appliance Energy Conservation Act-compliant water heaters assisted by a *desuperheater water heater* listed and labeled to AHRI 470 or assisted by a solar water heating system having a solar system heating fraction of not less than 0.50.

A hot water storage tank shall be provided for solar water heating systems except where the solar water heating system can utilize the storage tank of another type of water heater in the *service water heating* system.

Exception: National Appliance Energy Conservation Act-compliant water heaters shall not be required to be assisted by a desuperheater water heater or assisted by a solar water heating system where the entire hot water demand for a building is provided by one or more of the following:

1. a heat pump water heater with an energy factor, EF, of 2.0 or greater
2. a solar water heating system having a solar system heating fraction of 1.0
3. an instantaneous water heater
4. a fuel-gas fired storage water heater with energy factor, EF, of 0.67 or greater

RE123-13
Final Action: AS AM AMPC____ D

RE125-13, Part II

R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART III.

Proposed Change as Submitted

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein (Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART II-IPC

Revise as follows:

[E] 607.2.1 ~~Hot~~ Heated water circulation and temperature maintenance systems ~~controls~~. For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, automatic circulating hot water system pumps or heat trace shall be arranged to be conveniently turned off, automatically or manually, when the hot water system is not in operation. Heated water circulation and temperature maintenance systems for Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.

[E] 607.2.1.1 Group R2, R3 and R4 occupancies 3 stories or less. This section shall apply to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. *Access* to automatic controls, temperature sensors and pumps shall be provided. *Ready access* to manual controls shall be provided.

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standards to Chapter 14 as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue

New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

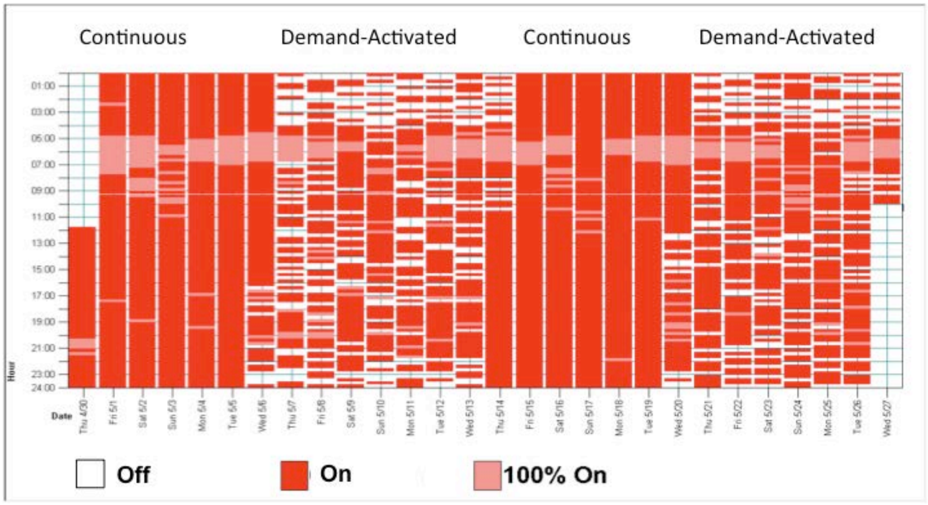
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	**Br**	**T-Br**
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Committee Action Hearing Results

PART II – IPC

Committee Action: **Approved as Modified**

Modify the proposal as follows:

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. ~~Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~ Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standard to Chapter 14 as follows:

UL

515-2011 Electrical Resistance Heat Tracing for Commercial and Industrial Applications including revisions through November 30, 2011

Committee Reason: The originally proposed control technology was too specific. The modified wording allows for different types of control technology. The UL 515 standard was added because most manufacturers are certifying heat trace products to the UL standard. The overall proposal was approved because the committee generally agreed that it costs too much to operate a circulation system all the time.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

[E] 607.2.1 Heated water circulation and heat trace ~~temperature maintenance~~ systems. For ~~other than~~ Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, ~~automatic circulating hot water system pumps or heat trace shall be arranged to be conveniently turned off, automatically or manually, when the hot water system is not in operation.~~ heated water circulation and heat trace systems shall be installed in accordance with Section R403.4.1 of the *International Energy Conservation Code*. For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, heated water circulation and heat trace ~~temperature maintenance~~ systems ~~for Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane~~ shall be installed in accordance with ~~Section 607.2.1.1.~~ Section C404.5 of the *International Energy Conservation Code*. ~~circulating hot water systems shall be arranged to be provided with a manual switch having ready access, or an automatic switch, that can turn off the hot water circulating pump when the system is not in use. Heated water circulation and temperature maintenance systems for other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.~~

~~**[E] 607.2.1.1 For other than Group R2, R3 and R4 occupancies 3 stories or less**. This section shall apply to other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. *Access* to automatic controls, temperature sensors and pumps shall be provided. *Ready access* to manual controls shall be provided.~~

~~**[E] 607.2.1.1.1 Circulation systems**. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.~~

~~**[E] 607.2.1.1.2 Heat trace systems.**~~ ~~Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.~~

~~**Add standard to Chapter 14 as follows:**~~

~~**IEEE**~~
~~515.1 2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications~~

~~**UL**~~

~~515-2011~~ ~~Electrical Resistance Heat Tracing for Commercial and Industrial Applications including revisions through November 30, 2011~~

Commenter's Reason: The purpose of this proposal is to clarify the requirements for heated water circulation systems and for heat trace systems, <u>if they are installed</u>. The proposed changes do not require the use of circulation or heat trace.

The reason for this code change is to correlate the language in the IECC with that in the IPC. The floor modifications heard by the Committee were correct as far they went. However, on further review, parts of the original proposal that were not modified are complicated and undermine the intent of the modifications that were approved.

The requirements for efficient heated water circulation and electrical heat trace systems belong in the IECC. However, it is important for those implementing the IPC to know what is required of them when installing these systems. These systems affect the design and layout of the overall domestic piping supply, and need to carry a reference to avoid lapses in coordination with other requirements of the system controls.

In order to decrease the possibility of conflicting language appearing in the two documents, it makes sense to have the provisions in the IECC and the pointer in the IPC. This greatly simplifies the code language.

Supporting this modification will correlate the language in the IPC with that in the IECC.

I urge your support.

RE125-13, Part II

Final Action: AS AM AMPC____ D

RE125-13, Part III

R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART III.

Proposed Change as Submitted

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein (Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART III-IRC

Add new text as follows:

SECTION P2905
HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Heated water systems. Heated water circulation and temperature maintenance systems shall be in accordance with Section N1103.4.1.

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

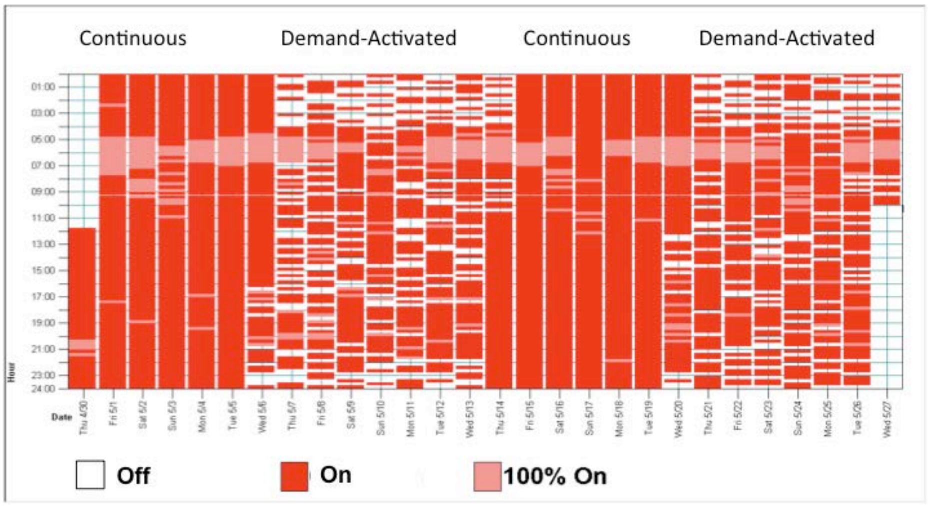
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	**Br**	**T-Br**
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R403.4.1 #2-EC-KLEIN

Committee Action Hearing Results

For staff analysis of the content of IEEE 515.1-2012 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART III – IRC-Plumbing

Committee Action: **Disapproved**

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2905.1 Heated water <u>circulation systems and heat trace</u> systems. ~~Heated water circulation and temperature maintenance systems shall be in accordance with Section N1103.4.1.~~ <u>Circulation systems and heat trace systems, that are installed to bring heated water in close proximity to one or more fixtures, shall meet the requirements of Section N1103.4.1.</u>

Commenter's Reason: The Committee disapproved the code change because they felt there was no need for a pointer to another section in the IRC.

These systems affect the design and layout of the overall water distribution in a building. Designers and installers need to realize that temperature maintenance systems have requirements that are buried in the energy code chapters of the IRC. Plumbing-oriented users of the IRC have, in the past, simply focused on the plumbing chapters for their work. They rely on many pointers in the plumbing chapters to help remind them pick up plumbing-related items outside those chapters. For example, Sections P2602.2, P2603.2, P2801.3, P2801.7, P2903.8, P3001.2, and P3101.5. Let's help these readers understand how to design and install water temperature maintenance systems correctly the first time instead of embarrassing them at final inspection. This is just a simple pointer, not a code requirement.

The language of this "pointer section" is being reworded because during testimony at the hearing, I heard that some people thought this proposal *required* circulation systems and heat trace systems. No, that was not the intent and is not the intent of this reworded section. All this section is saying is where such systems are installed, do it in accordance with that section in the energy code chapter. The 2012 IRC *does not require* these systems. Perhaps another proposal in this cycle will be approved to require some limit as to how far away a fixture can be from the hot water source, I don't know at this point.

I urge your support of this comment.

RE125-13, Part III
Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

RE125-13
R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)),
R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5,
IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW),
IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein (Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.1 (IRC N1103.4.1) ~~Circulating~~ ~~hot~~ Heated water circulation and temperature maintenance systems (Mandatory)~~.~~ ~~Circulating hot water systems shall be provided with an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in use.~~ Heated water circulation systems shall be in accordance with Section R403.4.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.4.1.2. Automatic controls, temperature sensors and pumps shall be *accessible*. Manual controls shall be *readily accessible*.

R403.4.1.1 (IRC N1103.4.1.1) Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

R403.4.1.2 (IRC N1103.4.1.2) Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standards to Chapter 5 (IRC Chapter 44) as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

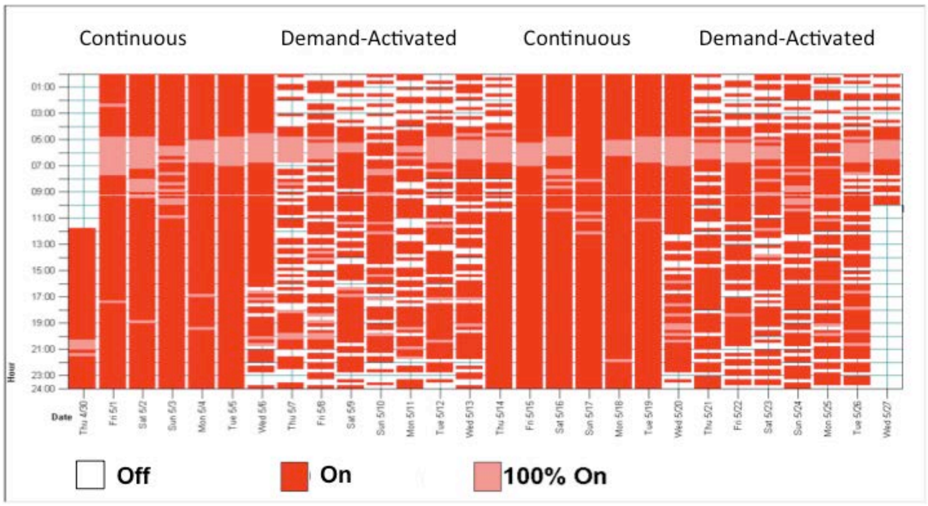
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	Br	T-Br
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the

ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.
RE125-13

For staff analysis of the content of IEEE 515.1-2012 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART I – IECC – Residential

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R403.4.1.1 (IRC N1103.4.1.1) Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. ~~Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~ Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

R403.4.1.2 (IRC N1103.4.1.2) Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standard to Chapter 14 as follows:

UL

515-2011 Electrical Resistance Heat Tracing for Commercial and Industrial Applications including revisions through November 30, 2011

Committee Reason: The originally proposed control technology was too specific. The modified wording allows for different types of control technology. The UL 515 standard was added because most manufacturers are certifying heat trace products to the UL standard. The overall proposal was approved because the committee generally agreed that it costs too much to operate a circulation system all the time.

Assembly Action: **None**

RE126-13
R403.4.1 (IRC N1103.4.1)

Proposed Change as Submitted

Proponent: Eric Makela / Britt/Makela Group, Inc. representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

R403.4.1 (N1103.4.1) Circulating hot water systems (Mandatory). Circulating hot water systems shall be ~~provided with an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in use~~ <u>equipped with a control system that controls the recirculation pump operation based on measurement of hot water demand and hot water return temperature.</u>

Reason: The IECC has allowed the use of either manual or automatic controls for turning circulating pumps on and off for hot water recirculating systems. If manual controls are installed, the homeowner is responsible for turning the system on and off when needed. If not turned off, the pump will continue to circulate 120^{o} to 140 ^{o}F water through piping leading to pipe heat loss and also requiring the water heater to run longer to continue to bring the water up to temperature. Installing a time clock on the circulation pump is more dependable if set properly, but still can lead to losses in the piping and additional run time for the water heater with no benefit to the home owner if set to run when the occupants are not in the house. In addition to piping and water heating energy use, electricity to run the pump can also cost a few hundred dollars per year. Constant recirculation of hot water can also degrade piping. A study conducted by the California Energy Commission's Public Interest Energy Research demonstrated that hot water distribution systems lose significant amounts of energy. This is significant considering that water heating uses 31% of energy in a typical house.

Demand control is the best automatic control option and superior to both manual off and time clock controls. The design features will prevent the pump motor burning out due to an air pocket, which is a common failure. The demand controlled recirculation system matches the user's demand to the delivery of hot water. The user gets the hot water quickly when they want it. On demand pumps for water heating systems can potentially save $2 billion dollars a year in existing single family homes and $100 million in new construction. There is more potential for multi-family buildings. On demand systems prevent energy waste and mean less maintenance and repair costs over a standard recirculation system because the pump is only on when the occupant requires hot water.

This proposal will increase energy and water savings over a water heater circulation system with manual or automatic controls.

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

R403.4.1-EC-MAKLEA.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Disapproval requested by the proponent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Eric Makela, Britt/Makela Group representing the Northwest Energy Codes Group requests Approval as Submitted.

Commenter's Reason: The IECC has allowed the use of either manual or automatic controls for turning circulating pumps on and off for hot water recirculating systems. If manual controls are installed, the homeowner is responsible for turning the system on an off when needed. If not turned off, the pump will continue to circulate 120^{o} to 140 ^{o}F water through piping leading to pipe heat loss and also requiring the water heater to run longer to continue to bring the water up to temperature. Installing a time clock on the circulation pump is more dependable if set properly, but still can lead to losses in the piping and additional run time for the water heater with no benefit to the home owner if set to run when the occupants are not in the house. In addition to piping and water heating energy use, electricity to run the pump can also cost a few hundred dollars per year. Constant recirculation of hot water can also degrade piping. A study conducted by the California Energy Commission's Public Interest Energy Research demonstrated that hot water distribution systems lose significant amounts of energy. This is significant considering that water heating uses 31% of energy in a typical house.

Demand control is the best automatic control option and superior to both manual off and time clock controls. The design features will prevent the pump motor burning out due to an air pocket, which is a common failure. The demand controlled recirculation system matches the user's demand to the delivery of hot water. The user gets the hot water quickly when they want it. On demand pumps for water heating systems can potentially save $2 billion dollars a year in existing single family homes and $100 million in new construction. There is more potential for multi-family buildings. On demand systems prevent energy waste and mean less maintenance and repair costs over a standard recirculation system because the pump is only on when the occupant requires hot water.

Approval of this proposal will increase energy and water savings as compared to a hot water circulation system with manual or automatic controls.

RE126-13

Final Action: AS AM AMPC____ D

RE129-13, Part I

R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2), IPC [E]607.5, IRC P2905 (NEW)

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART III

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE PROPOSALS. PART III WILL BE HEARD BY THE IRC-MP COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.2 (IRC N1103.4.2) ~~Hot~~ Heated water pipe insulation (Prescriptive). Piping conveying water heated by a water heater shall be insulated. The insulation shall have a thermal resistance (*R-value*) of not less than R-3 or where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be not greater than 0.28 Btu per inch/h●ft^2 ● F [0.40 W/(m●K)] for water temperatures less than or equal to 140°F (60°C) and not greater than 0.29 Btu per inch/h●ft^2 ● F [0.42 W/(m●K)] for water temperatures greater than 140°F (60°C) and less than or equal to 200°F (93.3°C). Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. ~~Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:~~

1. ~~Piping larger than 3/4 inch (19 mm) nominal diameter.~~
2. ~~Piping serving more than one dwelling unit.~~
3. ~~Piping from the water heater to for kitchen outlets.~~
4. ~~Piping located outside the conditioned space.~~
5. ~~Piping from the water heater to a distribution manifold.~~
6. ~~Piping located under a floor slab.~~
7. ~~Buried in piping.~~
8. ~~Supply and return piping in recirculation systems other than demand recirculation systems.~~
9. ~~Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table 403.4.2.~~

~~All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table 403.4.2.~~

~~TABLE R403.4.2 (N1103.4.2)~~
~~MAXIMUM RUN LENGTH (feet)~~[a]

~~Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)~~	~~3/8~~	~~1/2~~	~~3/4~~	~~>3/4~~
~~Maximum Run Length~~	~~30~~	~~20~~	~~10~~	~~5~~

~~For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm~~
~~a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.~~

Exceptions: Insulation shall not be required to be installed on the following:

1. Flexible connectors or reduced sized fixture supply tubing from the connection at the end of the fixture supply piping to a fixture fitting.
2. Valves, pumps and threaded unions in heated water piping.
3. Piping from shower and bath mixing valves to the water outlets.
4. Cold water piping that receives heated water as part of a water recirculation system that does not have a dedicated return pipe to the water heater.
5. Tubing from hot drinking-water heating units to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping or tubing from a tankless water heater serving only one fixture.

TABLE R403.4.2 (N1103.4.2)
TUBULAR INSULATION WALL THICKNESS

NOMINAL PIPE OR TUBE DIAMETER (inches)	**MINIMUM INSULATION WALL THICKNESS (inches)**	
	≤140 °F WATER TEMPERATURE	**>140 °F to 200°F WATER TEMPERATURE**
≤3/8	3/8	3/8
> 3/8 to <3/4	1/2	1/2
> 3/4 to <1	3/4	1
≥1 to <1 1/2	1	1 1/2
≥1 ½ to <4	1 1/2	2
≥4 to <8	1 1/2	2
≥8	1 1/2	2

For SI: 1 inch = 25.4 mm; °C = [(°F – 32)]/1.8

Reason: PART I-IECC The current requirements as to where pipe insulation must be installed and the run length allowance where insulation *doesn't* have to be installed, are much too complex for most installers to comprehend. Think of trying to explain the current run length allowance to the typical person that ends up performing this type of work. It also requires too much thinking on the part the inspector when the inspector is facing a plumbing system that has some hot water piping insulated and some not. The insulation requirement needs to be simple – just insulate all of the hot water piping. The minor amount of savings by not insulating some lengths of hot water piping is overshadowed by confusion/time wasted in the field and the significant potential of not getting it correct (and failing an inspection).

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. However, an installer *could* try to justify not installing insulation on any piping with the claim that they intended to set the water heater temperature at 108F. This is not the intent of the existing language and by using the phrase "water heated by a water heater", this loophole will be closed.

The description of the required insulation is expanded. Where tubular pipe insulation is used, that material does not have an R value rating. The equivalent R value must be calculated. And while some submittal specification sheets show the equivalent R-value for each wall thickness, some do not. And how often does a submittal sheet show up on a jobsite? Tubular pipe insulation is specified in wall thickness and k value. The k value in this code section covers the most commonly used insulation materials for this application. To keep it simple – Table R403.4.2 is provided to show the required wall thicknesses that closely approximates a R value of R-3 for the two most common types of pipe insulation materials. This takes the calculations out of the picture to make it simple for installers and inspectors.

The option for insulating piping with materials that are R-value rated was left in this section because it is sometimes possible to "encapsulate" piping within wall or ceiling insulation without the need for installing tubular pipe insulation. Where piping is properly "nested" into fiberglass batts in walls or is covered with spray-in foam systems, the installation of tubular pipe insulation is a waste of time and money. This option needs to remain to allow these alternate cost savings methods to be used.

The last sentence "Pipe insulation shall be continuous along all piping." is intended to prohibit a common practice of just insulating piping up to where the piping enters and exits a structural member. For example, a pipe that runs vertically through the bottom plate of a wall or through a joist needs to be insulated continuously through those members in order for the insulated piping system to be effective in reducing energy loss.

The exceptions are added to this section to clarify where "piping insulation" is not required. Most items are common sense. Valves and pumps are difficult to insulate and the benefit of such effort is minimal. Let's keep is simple and easy.

PART II– IPC

The text that is struck out in IPC 607.5 is replaced with text that points the appropriate sections on the IECC that cover insulation.

Normally, the IPC only covers plumbing in commercial buildings. However, because the residential chapters in the IECC covers R2, R3 and R4 occupancy buildings that are 3 stories or less above grade plane in height *and* these occupancies are not covered by the plumbing chapter in the IRC, there needs to be a 'pointer section' in the IPC to alert the plumbing installer that there are piping insulation requirements in the residential provisions of the IECC that apply. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

PART III – IRC

A new section is added in Chapter 29 of the IRC to alert the plumbing installer that the heated water piping installation must allow for insulating of the piping system. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

Cost Impact: None.

R403.4.2-EC-KLEIN

Committee Action Hearing Results

PART I – IECC – Residential

Committee Action: Approved as Modified

Modify the proposal as follows:

R403.4.2 (IRC N1103.4.2) Heated water pipe insulation (Prescriptive). Piping conveying water heated by a water heater shall be insulated. The insulation shall have a thermal resistance (*R-value*) of not less than R-3 or where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be ~~not greater than 0.28 Btu per inch/h•ft^2 • F [0.40 W/(m•K)] for water temperatures less than or equal to 140°F (60°C) and~~ not greater than ~~0.29~~ 0.31 Btu per inch/h•ft^2 • F [~~0.42~~ W/(m•K)] at ~~for water temperatures greater than 140°F (60°C) and less than or equal to~~ 200°F (93.3°C) and the minimum wall thickness shall be ½ inch (12.7 mm). Piping that is heat traced shall be insulated in accordance with the heat trace manufacturer's instructions. ~~Tubular~~ Pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation.

Exceptions: Insulation shall not be required to be installed on the following:

1. Flexible connectors or reduced sized fixture supply tubing from the connection at the end of the fixture supply piping to a fixture fitting.
2. Valves, pumps and threaded unions in heated water piping.
3. Piping from shower and bath mixing valves to the water outlets.
4. Cold water piping that receives heated water as part of a water recirculation system that does not have a dedicated return pipe to the water heater.
5. Tubing from hot drinking-water heating units to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping or tubing from a tankless water heater serving only one fixture.

~~TABLE R403.4.2 (N1103.4.2)~~
~~TUBULAR INSULATION WALL THICKNESS~~

~~NOMINAL PIPE OR TUBE DIAMETER (inches)~~	**~~MINIMUM INSULATION WALL THICKNESS (inches)~~**	
	~~≤140 °F WATER TEMPERATURE~~	**~~>140 °F to 200°F WATER TEMPERATURE~~**
~~≤3/8~~	~~3/8~~	~~3/8~~
~~> 3/8 to <3/4~~	~~1/2~~	~~1/2~~
~~> 3/4 to <1~~	~~3/4~~	~~1~~
~~≥1 to <1 1/2~~	~~1~~	~~1 1/2~~
~~≥1 ½ to <4~~	~~1 1/2~~	~~2~~
~~≥4 to <8~~	~~1 1/2~~	~~2~~
~~≥8~~	~~1 1/2~~	~~2~~

~~For SI: 1 inch = 25.4 mm; °C = [(°F – 32)]/1.8~~

Committee Reason: The modifications were made to 1) simplify the requirements for insulating piping and 2) allow for the use of mineral fiber type insulation. The overall proposal was approved because the existing language was not clear as to what piping needed insulated.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by the Code Committee as Published in the ROH.

Commenter's Reason: The Committee approved the modifications because they 1) simplified the requirements for insulating piping and 2) allowed for the use of mineral fiber type insulation. The overall proposal was approved because the existing language was not clear as to what piping needed insulated.

This section on insulating hot water piping is now much simpler to understand, implement and enforce: all hot water piping is to be insulated, with a few exceptions.

I urge your support of this code change.

For those who want a more detailed analysis, please continue reading:

Benefits of Pipe Insulation

In 2012, researchers at Lawrence Berkeley National Laboratory were able to analyze the hot water use data from 12 independent studies representing 159 single family households in climate zones covering much of the United States and some parts of Canada (see Figure 1). There were more than 22,900 days of data and 1,679,668 hot water draws, an average of more than 73 draws per day.

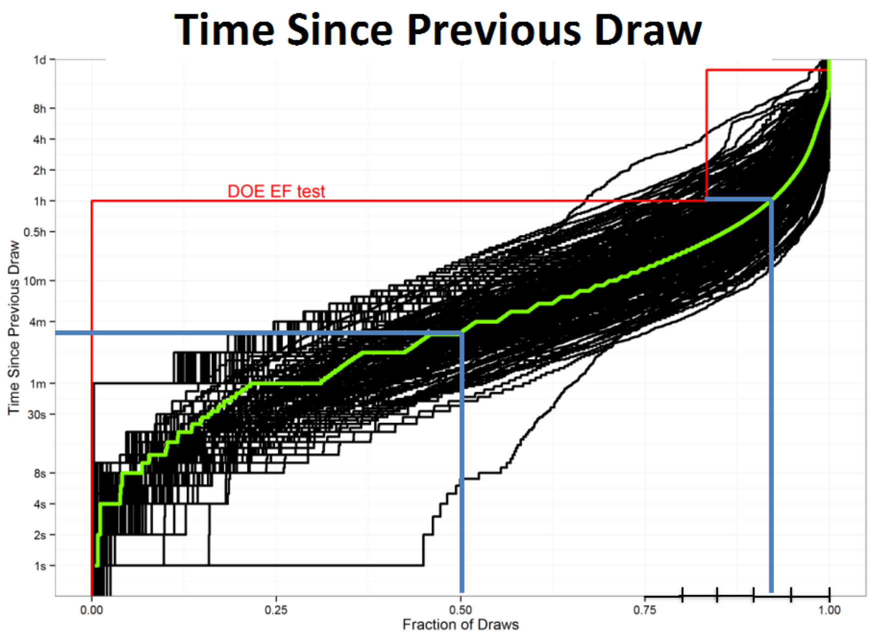
Figure 1. Location of Monitored Homes

Source: Jim Lutz and Moya Melody, Typical Hot Water Draw Patterns Based On Field Data, Lawrence Berkeley National Laboratory, November 2012.

Figure 2 shows this as the cumulative distribution of time from the previous draw. The green line is the mean of the data. The study found that almost 95 percent of all hot water events occurred within 60 minutes of each other. Hot water events are highly clustered as evidenced by 50% of all events occurring less than 3 minutes apart. This clustered hot water draw pattern matches what water utilities tell us about water use patterns which are dominated by morning peaks of 1-2 hours duration and evening secondary peaks of 3-5 hours duration during the work and school week and more spread-out use on the weekends, including lunch time and washing machine uses.

The clustering of hot water events is important relative to pipe insulation because the water in uninsulated ½ inch nominal pipe surrounded by room temperature air cools down from 120F to 105F in about 10 minutes; in ¾ inch nominal pipe it cools down in about 15 minutes. R-3 pipe insulation roughly doubles the cool down time to 20 minutes for ½ inch piping and roughly triples it to 45 minutes for ¾ inch piping. When the time between hot water events exceeds one hour, the water in the insulated pipes is likely to cool down back to ambient, minimizing the benefit of pipe insulation for spread out draws.

Figure 2. Time Since Previous Hot Water Event



Source: Jim Lutz and Moya Melody, Typical Hot Water Draw Patterns Based On Field Data, Lawrence Berkeley National Laboratory, November 2012.

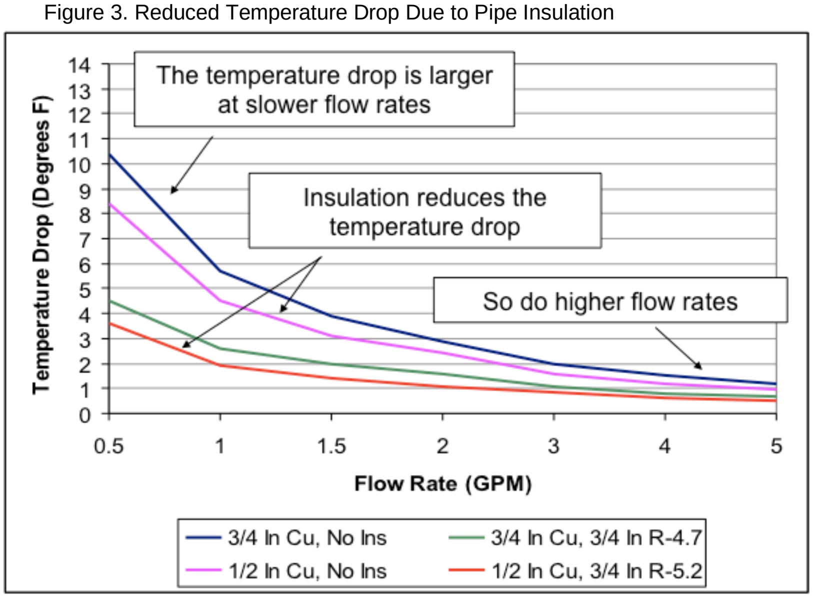
By delaying the cool-down time, insulation increases the number of “hot starts”-draws where the water in the pipe is hot enough for the next use-which reduces the amount of water that runs down the drain before hot water arrives at the fixtures. This reduces the time-to-tap for hot water to arrive, water waste and operating costs.

Another benefit of pipe insulation is that it reduces the temperature drop over a given distance of pipe to roughly half of what it would be at a given flow rate in uninsulated pipe. This can be seen in Figure 3. As an example, assuming a flow rate of 1 gpm in 100 feet of ¾ inch piping the temperature drop in uninsulated pipe would be about 5.5 F. Pipe insulation reduces this to about 2.75 F. This is important because reducing the temperature drop over the length of piping in the building means that would be possible to reduce the temperature at the water heater. Reducing the set-point temperature of a storage water heater by 1F will reduce the stand-by heat losses by at least 1 percent.

Both benefits are greater when the piping runs through harsher environments such as vented crawl spaces or attics in winter, unconditioned basements in cold climates and under slab foundations.

Floor plans and piping configurations that reduce the number of feet of piping also reduce the temperature drop, while at the same time reducing installation costs for both piping and pipe insulation.

Figure 3. Reduced Temperature Drop Due to Pipe Insulation



Estimated Insulation Costs

Pacific Northwest Laboratory provided an analysis that was used to support the DOE proposal on pipe insulation (Gary Klein, Affiliated International Management, LLC, *Cost Estimation for Materials and Installation of Hot Water Piping Insulation*, PNNL, June 2012). Excerpts from that analysis are used here.

The piping configuration used in the analysis was selected so that there is one trunk line for all hot water outlets; each outlet has its own relatively short branch from this trunk. To be conservative, the analysis assumed a relatively stretched out piping configuration for the 1-story 2400 ft^2 house; more feet, more cost. The 2-story 2400 ft^2 house has roughly half as many feet of pipe as the 1-story house; the piping configuration is much more compact. The 1-story 1200 ft^2 apartment piping configuration has the same "compactness" as the 2-story 2400 ft^2 house; the smaller number of feet are due to fewer fixture fittings. A 2-story 1200 ft^2 apartment could have an even more compact configuration and fewer feet of piping and associated insulation.

Figure 4 shows the estimated feet of pipe and for each configuration and the costs associated with each of three pricing assumptions. The cost estimates assume the use of R-3 (roughly ½ inch wall thickness, the same as the requirements in this code section) pipe insulation on all hot water piping. It would be possible to reduce costs by surrounding the piping in the attic with blown-in attic insulation.

The costs per foot for the low cost column were obtained by asking one of Northern California's largest residential new construction plumbing installers for price estimates. The costs per foot for the high cost column were obtained from three plumbers that work in the Orlando, Florida residential new construction market. Both of these costs are significantly lower than costs obtained from RS Means (more than $7 per foot) and are judged to be much more realistic of actual pipe installation costs in residential new construction. All of the costs assume the use of foam, not rubber or fiberglass pipe insulation. Foam is the least expensive and the one most commonly used when plumbers bid on installing pipe insulation.

Figure 4. Estimates of Feet of Pipe Insulation and Costs for Selected Floor Plans

	Estimates		
	Feet of Pipe Insulation	Installed Cost	
		Low	High
1-story 2400 sf	215	$ 236.50	$ 322.50
2-story 2400 sf	124	$ 136.40	$ 186.00
1-story 1200 sf	112	$ 123.20	$ 168.00

One important conclusion from this analysis is that it is possible to have a compact piping configuration in any size dwelling. The closer the hot water locations are to each other and to the water heater(s)that serve them, and the more directly the hot water piping is run from the water heater(s) to the fixture fittings, the fewer feet of pipe and therefore pipe insulation. The fewer feet, the less it costs to install.

Conversely, it is possible to install more feet of pipe and therefore pipe insulation than was assumed in this analysis. A more pipe-intensive hot water distribution method, such as a home-run manifold system could be chosen, or unnecessarily long trunks and branches could be installed in the system that was analyzed. More pipe means more pipe insulation. The more feet, the more it costs to install. It is unclear why this is beneficial to either the plumber or the builder, but unfortunately excessively long hot water distribution systems are often found in new construction.

Estimated Energy Savings

To estimate the energy savings it is reasonable to assume that the average length to the fixtures in the house is half the trunk length plus the length of the branch to the fixtures. The 1-story house has an average length of 67 feet; the 2-story house and the apartment have an average length of 31 feet. For simplicity we will use a range of 30-60 feet. The average volume in the 1-story house is about 1.5 gallons; the average volume in the 2-story house and the apartment is about 0.6 gallons.

The temperature drop without insulation over this distance ranges from 1.5-3.0 F. Insulation will reduce this to 0.75-1.5F. This analysis will assume insulation reduces the temperature drop by 1F.

Reducing the temperature drop by 1F reduces the stand-by heat losses by at least 1 percent. A typical gas storage water heater uses about 4,000,000 Btu per year for stand-by losses; an electric water heater uses about 1,000,000 Btu per year. This means the savings will be 40,000 Btu per year for natural gas and 10,000 Btu per year for electricity.

Based on the LBNL research findings, the typical house has about 73 hot water events each day. About 30 percent, or 21 of the draws are within 10 and 60 minutes apart (see Figure 2). Pipe insulation will eliminate most of the water and energy wasted while waiting for all of these hot water draws. When water is run down the drain waiting for hot water to arrive, new water enters the water heater to be heated. This means that it is necessary to account for the energy attached to this water by using the temperature difference between incoming cold-water temperatures and the water heater set point temperature. To be conservative, this analysis will assume that this temperature difference is only 50F, which is reflective of a warm climate.

Research sponsored by the California Energy Commission (reported by Hiller in ASHRAE) has shown that more water than is in the pipes comes out of the pipes before hot water arrives at the fixture fitting; for flow rates between 1 and 2 gpm, the additional waste ranges from 1.5 – 1.25 times the volume, respectively. Yes, the waste increases as the flow rate goes down. To be conservative, this analysis does not include this additional volume in the calculations.

Figure 5 converts volumetric waste into energy wasted. To find the range of potential savings we need to find the average volume that might be wasted per event (ranging from 0.6-1.5 gallons per event); follow that down until it intersects with the number of such events (21) and go over to the left to determine the number of Btus. Based on the assumptions in this analysis, the energy lost due to wasting water while waiting for the hot water to arrive ranges from 1,500,000 to 4,500,000 Btu per year.

The reduction in volumetric losses dominates the savings due to pipe insulation, so we will use those values to estimate the savings potential.

Assuming the typical household uses 60 gallons per day of hot water and the temperature is raised from 50 to 130F (a greater temperature rise than was assumed for the cool-down losses) it takes 14.6 million Btu a year to heat the water, not including the inefficiencies of the water heater. If the savings due to pipe insulation ranges from 1.5 to 4.5 million Btu per year, the percent savings ranges from 10.2 to 30.8 percent.

Figure 5 Converting Volume That Cools Down into Annual Energy

			Volume in Pipe That Cools Down							
		Gallons	0.0625	0.125	0.25	0.5	0.75	1	1.5	2
		Cups	1	2	4	8	12	16	24	32
Heat Loss										
Btu/Year	Btu/Day		Number of Times Per Day that Water in Pipe Cools Down							
500,000	1,370		53	26	13	7	4.4	3.3	2.2	1.6
1,000,000	2,740		105	53	26	13	9	7	4.4	3.3
1,500,000	4,110		158	79	39	20	13	10	7	5
2,000,000	5,479		210	105	53	26	18	13	9	7
2,500,000	6,849		263	132	66	33	22	16	11	8
3,000,000	8,219		316	158	79	39	26	20	13	10
3,500,000	9,589		368	184	92	46	31	23	15	12
4,000,000	10,959		421	210	105	53	35	26	18	13
4,500,000	12,329		474	237	118	59	39	30	20	15
5,000,000	13,699		526	263	132	66	44	33	22	16
5,500,000	15,068		579	289	145	72	48	36	24	18
6,000,000	16,438		631	316	158	79	53	39	26	20

This estimate is conservative for at least two reasons. First, the typical home has more stretched out piping than was assumed in the 2-story house and the 1-story apartment, so the volume of wasted water will be larger than estimated for the lower end of the range of volumetric losses. Second, the actual temperature difference between incoming cold water and the hot water set point is often less than 80F, so the energy needed to heat the water that has been wasted is likely to be smaller than estimated. Both of these factors will result in larger percentage savings.

In addition to the energy savings at the house, reducing water use saves energy by not having to treat and deliver cold water to the home and by not having to remove, treat and discharge the waste water. This energy savings generally does not occur at the home, unless one has a well. This is on the order of 5 kWh/1000 gallons for urban water and waste water systems combined; these energy savings were not included in this analysis.

Public Comment 2:

W. Ronald Burton of PTW Advisors, LLC representing Leading Builders of America requests Disapproval.

Commenter's Reason: The recommendation by the Residential IECC Code Development Committee for As Modified on code change proposal RE129-13 Part I should be overturned and the proposal disapproved. The proposal would require insulation on all hot water piping not currently required to be insulated regardless of its location in the structure. The proponent cites as a reason for making this change that the current requirements "are much too complex for most installers to comprehend" and further states that "it takes too much thinking on the part of the inspector…". We submit that the IECC already requires most hot water piping to be insulated including all piping to kitchen outlets and any distribution manifolds. Exceptions include specific piping from a distribution manifold to individual fixtures, but even that piping and any other piping runs must be no longer than the very limited lengths allowed in Table R403.4.2. We further submit that both plumbing contractors and plumbing inspectors are perfectly capable of dealing with complex plumbing systems – in fact they do it on a daily basis - and it is insulting to contend that the very clear requirements for insulating hot water piping in the residential section of the IECC are "too complex" and require "too much thinking". Finally, we submit that the cost of additional HW piping insulation required by this proposal is not justified by the minor savings in energy usage and this alone is ample reason for disapproval of this proposal.

RE129-13, Part I

Final Action: AS AM AMPC____ D

RE129-13, Part III

R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2), IPC [E]607.5, IRC P2905 (NEW)

NOTE: PART II DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA, PART II IS REPRODUCED FOR INFORMATION PURPOSES FOLLOWING ALL OF PART III

<u>Proposed Change as Submitted</u>

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE PROPOSALS. PART III WILL BE HEARD BY THE IRC-MP COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART III – IRC-P

Add new text as follows:

<u>SECTION P2905</u>
<u>HEATED WATER DISTRIBUTION SYSTEMS</u>

<u>P2905.1 Insulation of piping required.</u> <u>Piping conveying water heated by a water heater shall be insulated in accordance with Section N1103.4.2.</u>

Reason: PART I-IECC The current requirements as to where pipe insulation must be installed and the run length allowance where insulation *doesn't* have to be installed, are much too complex for most installers to comprehend. Think of trying to explain the current run length allowance to the typical person that ends up performing this type of work. It also requires too much thinking on the part the inspector when the inspector is facing a plumbing system that has some hot water piping insulated and some not. The insulation requirement needs to be simple – just insulate all of the hot water piping. The minor amount of savings by not insulating some lengths of hot water piping is overshadowed by confusion/time wasted in the field and the significant potential of not getting it correct (and failing an inspection).

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. However, an installer *could* try to justify <u>not</u> installing insulation on any piping with the claim that they intended to set the water heater temperature at 108F. This is not the intent of the existing language and by using the phrase "water heated by a water heater", this loophole will be closed.

The description of the required insulation is expanded. Where tubular pipe insulation is used, that material does not have an R value rating. The equivalent R value must be calculated. And while some submittal specification sheets show the equivalent R-value for each wall thickness, some do not. And how often does a submittal sheet show up on a jobsite? Tubular pipe insulation is specified in wall thickness and k value. The k value in this code section covers the most commonly used insulation materials for this application. To keep it simple – Table R403.4.2 is provided to show the required wall thicknesses that closely approximates a R value of R-3 for the two most common types of pipe insulation materials. This takes the calculations out of the picture to make it simple for installers and inspectors.

The option for insulating piping with materials that are R-value rated was left in this section because it is sometimes possible to "encapsulate" piping within wall or ceiling insulation without the need for installing tubular pipe insulation. Where piping is properly "nested" into fiberglass batts in walls or is covered with spray-in foam systems, the installation of tubular pipe insulation is a waste of time and money. This option needs to remain to allow these alternate cost savings methods to be used.

The last sentence "Pipe insulation shall be continuous along all piping." is intended to prohibit a common practice of just insulating piping up to where the piping enters and exits a structural member. For example, a pipe that runs vertically through the bottom plate of a wall or through a joist needs to be insulated continuously through those members in order for the insulated piping system to be effective in reducing energy loss.

The exceptions are added to this section to clarify where "piping insulation" is not required. Most items are common sense. Valves and pumps are difficult to insulate and the benefit of such effort is minimal. Let's keep is simple and easy.

PART II– IPC

The text that is struck out in IPC 607.5 is replaced with text that points the appropriate sections on the IECC that cover insulation.

Normally, the IPC only covers plumbing in commercial buildings. However, because the residential chapters in the IECC covers R2, R3 and R4 occupancy buildings that are 3 stories or less above grade plane in height *and* these occupancies are not covered by the plumbing chapter in the IRC, there needs to be a 'pointer section' in the IPC to alert the plumbing installer that there are piping insulation requirements in the residential provisions of the IECC that apply. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

PART III – IRC

A new section is added in Chapter 29 of the IRC to alert the plumbing installer that the heated water piping installation must allow for insulating of the piping system. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

Cost Impact: None.

R403.4.2-EC-KLEIN

Committee Action Hearing Results

PART III – IRC – Plumbing

Committee Action: **Disapproved**

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment

Modify the proposal as follows:

P2905.1 Clearance required for piping insulation ~~of piping required~~. The installation of piping conveying water heated by a water heater shall allow access for the installation of, and the clearances for, ~~be~~ ~~insulated in accordance with~~ piping insulation that is required by Section N1103.4.2.

Commenter's Reason: The Committee disapproved the code change because they felt there was no need of a pointer to another section in the IRC.

Heated water piping systems that are required to be insulated affects how the heated water piping system is designed and installed. Designers and installers need to realize the impact of installing heated water piping in certain locations because the proposed methods of insulating those systems might not allow adequate clearances or access. Plumbing-oriented users of the IRC have, in the past, simply focused on the plumbing chapters for their work. They rely on many pointers in the plumbing chapters to help remind them pick up plumbing-related items outside those chapters. For example, Sections P2602.2, P2603.2, P2801.3, P2801.7, P2903.8, P3001.2, and P3101.5. Let's help these readers understand that insulation might be required for some heated water pipes. If the piping installer is the installer of the insulation, then they will be informed as to where the insulation requirements are located in the IRC. If the piping installer is *not* that same as the insulation installer, it is imperative that the piping installer fully understand what pipes need insulated, what clearances are necessary to allow for the insulation to be installed, and what access to allow to that piping so the insulation installer can get in the location to perform the insulating work. This section will promote coordination between trades so the work is performed correctly the first time instead of embarrassing the trades people and the builder at final inspection.

This section does *not* require piping to be insulated. That is covered in the energy chapters. This section merely alerts the piping installer to allow room for the piping to be insulated, where insulation is necessary.

I urge your support of this comment.

RE129-13, Part III

Final Action: AS AM AMPC____ D

NOTE: PART II REPRODUCED FOR INFORMATION PURPOSES ONLY – SEE ABOVE

RE129-13, PART II-IPC

Revise as follows:

[E] 607.5 ~~Pipe~~ Insulation of piping. ~~Hot water piping in automatic temperature maintenance systems shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of hot water piping from a hot water-source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K).~~ For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5 of the *International Energy Conservation Code*. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Section R403.4.2 of the *International Energy Conservation Code*.

Reason: PART I-IECC The current requirements as to where pipe insulation must be installed and the run length allowance where insulation *doesn't* have to be installed, are much too complex for most installers to comprehend. Think of trying to explain the current run length allowance to the typical person that ends up performing this type of work. It also requires too much thinking on the part the inspector when the inspector is facing a plumbing system that has some hot water piping insulated and some not. The insulation requirement needs to be simple – just insulate all of the hot water piping. The minor amount of savings by not insulating some lengths of hot water piping is overshadowed by confusion/time wasted in the field and the significant potential of not getting it correct (and failing an inspection).

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. However, an installer *could* try to justify not installing insulation on any piping with the claim that they intended to set the water heater temperature at 108F. This is not the intent of the existing language and by using the phrase "water heated by a water heater", this loophole will be closed.

The description of the required insulation is expanded. Where tubular pipe insulation is used, that material does not have an R value rating. The equivalent R value must be calculated. And while some submittal specification sheets show the equivalent R-value for each wall thickness, some do not. And how often does a submittal sheet show up on a jobsite? Tubular pipe insulation is specified in wall thickness and k value. The k value in this code section covers the most commonly used insulation materials for this application. To keep it simple – Table R403.4.2 is provided to show the required wall thicknesses that closely approximates a R value of R-3 for the two most common types of pipe insulation materials. This takes the calculations out of the picture to make it simple for installers and inspectors.

The option for insulating piping with materials that are R-value rated was left in this section because it is sometimes possible to "encapsulate" piping within wall or ceiling insulation without the need for installing tubular pipe insulation. Where piping is properly "nested" into fiberglass batts in walls or is covered with spray-in foam systems, the installation of tubular pipe insulation is a waste of time and money. This option needs to remain to allow these alternate cost savings methods to be used.

The last sentence "Pipe insulation shall be continuous along all piping." is intended to prohibit a common practice of just insulating piping up to where the piping enters and exits a structural member. For example, a pipe that runs vertically through the bottom plate of a wall or through a joist needs to be insulated continuously through those members in order for the insulated piping system to be effective in reducing energy loss.

The exceptions are added to this section to clarify where "piping insulation" is not required. Most items are common sense. Valves and pumps are difficult to insulate and the benefit of such effort is minimal. Let's keep is simple and easy.

PART II– IPC

The text that is struck out in IPC 607.5 is replaced with text that points the appropriate sections on the IECC that cover insulation.

Normally, the IPC only covers plumbing in commercial buildings. However, because the residential chapters in the IECC covers R2, R3 and R4 occupancy buildings that are 3 stories or less above grade plane in height *and* these occupancies are not covered by the plumbing chapter in the IRC, there needs to be a 'pointer section' in the IPC to alert the plumbing installer that there are piping insulation requirements in the residential provisions of the IECC that apply. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

PART III – IRC

A new section is added in Chapter 29 of the IRC to alert the plumbing installer that the heated water piping installation must allow for insulating of the piping system. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

Cost Impact: None.

PART II – IPC

Committee Action: **Approved as Submitted**

Committee Reason: The plumbing code needs updated to provide an appropriate pointer to the energy code requirements.

Assembly Action: **None**

RE130-13
R403.4.2 (IRC N1103.4.2)

Proposed Change as Submitted

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self (eosann@nrdc.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than $^3/_4$ inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. In occupancies with three or more bedrooms, piping from the water heater or recirculation system piping to the outlet for any shower or tub/shower combination.
~~4~~5. Piping located outside the conditioned space.
~~5~~6. Piping from the water heater to a distribution manifold.
~~6~~7. Piping located under a floor slab.
~~7~~8. Buried piping.
~~8~~9. Supply and return piping in recirculation systems other than demand recirculation systems.
~~9~~10. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Reason: Every adult in the United States has experienced the waiting time for water that is hot enough to step into the shower. Most do so on a regular basis, and often for a minute or more. While cold or tepid water in the initial draw from a hot water outlet serving a clothes washer, dishwasher, or lavatory sink may be usable for its intended purpose, cold or tepid water for showering is routinely purged, a waste of water, energy, and time. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the shower sooner. During showering, pipe insulation keeps the water hotter by reducing the temperature drop from the source of hot water to the shower outlet. This saves significant energy by making it possible to reduce the set point for the storage temperature at the hot water heater. Every 1°F reduction in hot water storage temperature reduces standby heat losses by almost 2%. During the cool-down phase, pipe insulation increases the time it takes for the temperature of the water to cool down, roughly doubling the cool-down time for ½ inch nominal pipe and tripling it for ¾ inch nominal pipe. This saves energy, water, and time for all those hot water events, including showers, that are clustered between 10 and 45 minutes apart, as when occupants are getting ready for work and school in the AM.

Cost Impact: This code change proposal will increase the cost of construction only to the extent that all or a portion of the pipe run to a shower would not already require insulation under the existing requirements of Section R403.4.2. For example, under the current language of this section, hot water pipe running in an unconditioned crawl space or attic is required to be insulated. Pipe running from a water heater to a distribution manifold is also required to be insulated, while up to 20 feet of ½ inch supply piping from a manifold to an end use such as a shower may be uninsulated. At an estimated cost of materials, labor, and profit of $1.10 to $1.50 per linear foot for installing foam insulation[1], the cost of insulating 20 feet of ½ inch supply piping would be $22 to $30.
Klein, Gary, "Cost Estimation for Materials and Installation of Hot Water Piping Insulation," prepared for Pacific Northwest National Laboratory, June 2012, accessible at <http://bc3.pnnl.gov/wiki/index.php/Downloads>.

R403.4.2-EC-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Proponent requested disapproval based upon action on RE129-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council on behalf of self, requests Approval as Submitted.

Commenter's Reason: Every adult in the United States has experienced the waiting time for water that is hot enough to step into the shower. Most do so on a regular basis, and often for a minute or more. While cold or tepid water in the initial draw from a hot water outlet serving a clothes washer, dishwasher, or lavatory sink may be usable for its intended purpose, cold or tepid water for showering is routinely purged, a waste of water, energy, and time. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the shower sooner. During showering, pipe insulation keeps the water hotter by reducing the temperature drop from the source of hot water to the shower outlet. This saves significant energy by making it possible to reduce the set point for the storage temperature at the hot water heater. Every 1°F reduction in hot water storage temperature reduces standby heat losses by almost 2%. During the cool-down phase, pipe insulation increases the time it takes for the temperature of the water to cool down, roughly doubling the cool-down time for ½ inch nominal pipe and tripling it for ¾ inch nominal pipe. This saves energy, water, and time for all those hot water events, including showers that are clustered between 10 and 45 minutes apart, as when occupants are getting ready for work and school in the morning.

RE130-13

Final Action: AS AM AMPC____ D

RE131-13
R403.4.2 (IRC N1103.4.2)

<u>Proposed Change as Submitted</u>

Proponent: Edward R. Osann, on behalf of Natural Resources Defense Council; Ryan Meres, on behalf of Institute for Market Transformation.(eosann@nrdc.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (~~Prescriptive~~ <u>Mandatory</u>). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than $^3/_4$ inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
5. Piping from the water heater to a distribution manifold.
6. Piping located under a floor slab.
7. Buried piping.
8. Supply and return piping in recirculation systems other than demand recirculation systems.
9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Reason: The 2012 edition of the IECC added this prescriptive section on hot water pipe insulation, containing a list of 9 factors or locations that require pipe to be insulated to R-3. However, because it is prescriptive and not mandatory, it is not required in any project that opts for the performance approach. Unfortunately, while the 2012 IECC performance approach allows credit for improving the efficiency of the hot water heat source, no credit is available for features of the hot water distribution system that might actually reduce the amount of hot water used, such as those listed in R403.4.2. (The HERS rating system is similarly drawn, offering no credit for hot water pipe insulation.) Thus, although hot water pipe insulation is known to save significant amounts of energy over the life of the building, the energy savings cannot be "scored" or accumulated within the performance framework of the code. Section R403.4.2 cannot contribute to compliance under the IECC performance approach, and is thus likely to be ignored. For these energy savings to be realized in all new residential buildings covered by the IECC, R403.4.2 should be mandatory instead of prescriptive. If and when Section R405 is modified to ensure that the performance path will account for the energy attributes of the hot water distribution system, consideration can be given to removing the mandatory designation from some or all portions of R403.4.2.

As was noted by the original proponents of Section R403.4.2, insulation of hot water piping reduces the waste of energy, water, and time during the delivery, use, and cool-down phases of a hot water event. During the delivery phase, when the piping runs in unconditioned spaces, in a slab, when it is buried or when the flow rate is very low (less than 1 gpm), pipe insulation significantly reduces the heat loss and helps to ensure that hot enough water gets to the outlets. During the cool-down phase, pipe insulation increases the time it takes for the temperature of the water to cool down, roughly doubling the cool-down time for ½ inch nominal pipe and tripling it for ¾ inch nominal pipe. This saves energy, water and time for all those hot water events that are clustered between 10 and 45 minutes apart, as when occupants are getting ready for work and school in the morning and during evening activities such as preparing and cleaning up from supper and getting ready for bed, as well as lunchtime when people are home during the day.

As hot water is being used, pipe insulation keeps the water hotter by reducing the temperature drop from the source of hot water to the outlet. This saves additional energy by making it possible to reduce the set point for storage temperature at the hot water heater. Every 1°F reduction in hot water storage temperature reduces standby heat losses by almost 2%.

Cost Impact: This code change proposal will not increase the cost of construction for builders following the prescriptive approach, i.e., the majority of all builders. For those following the performance path, pipe insulation will be an added cost. A recent estimate[1] of the cost of insulating hot water piping with R-3 foam insulation is $1.10 to $1.50 per linear foot, including labor, materials, and profit for the plumbing subcontractor. The cost of insulating all hot water piping in a 2400 ft^2 home was estimated by the same study to be $135 to $325, depending on building configuration. It should be noted that these estimates are based on insulation of ***all*** hot water piping in the home, which is more than is required by Section R403.4.2. Thus the actual impact on the cost of construction should be somewhat less than this range in most cases.

[1]Klein, Gary, "Cost Estimation for Materials and Installation of Hot Water Piping Insulation," prepared for Pacific Northwest National Laboratory, June 2012, accessible at <http://bc3.pnnl.gov/wiki/index.php/Downloads>.

R403.4.2-EC-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Proponent requested disapproval based upon action on RE129-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of RE131 as submitted. Hot water pipe insulation requirements should be shown as "mandatory" since there is no mechanism to allow trade-offs under the performance path in Section R405. This approach will reduce confusion for buildings complying under the performance path as to what the insulation requirements are and will ensure that the energy saved from reasonable pipe insulation will be enjoyed by all residential buildings. If a reasonable method to include these requirements in the performance path for trade-offs is developed in the future, at that point the "mandatory" designation can be reconsidered.

RE131-13

Final Action: AS AM AMPC____ D

RE132-13
R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
2. Piping serving more than one dwelling unit.
~~3. Piping from the water heater to kitchen outlets.~~
~~4~~3. Piping located outside the conditioned space.
~~5~~4. Piping from the water heater to a distribution manifold.
~~6~~5. Piping located under a floor slab.
~~7~~6. Buried piping.
~~8~~7. Supply and return piping in recirculation systems other than demand recirculation systems.
~~9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.~~

~~All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.~~

~~TABLE R403.4.2 (N1103.4.2)~~
~~MAXIMUM RUN LENGTH (feet)[a]~~

~~Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)~~	~~3/8~~	~~1/2~~	~~3/4~~	~~> 3/4~~
~~Maximum Run Length~~	~~30~~	~~20~~	~~10~~	~~5~~

Reason: Research has been performed by a two different sources that indicate insulating hot water piping in a residential home is not cost effective. The NAHB Research Center performed a study in 2010 that concluded, based on a low cost estimate that the simple payback for insulating hot water piping was in the 60 to 100 year range based on the piping material. Additionally, a 2009 study presented by the National Renewable Energy Lab at the ASME 3rd International Conference of Energy Sustainability estimated paybacks between 72 and 183 years for various insulation configurations.

First cost, as determined in the NAHB Research Center report varied between $500 and $1,200. The NREL report had a slightly smaller house with an estimated installation cost of $366.

The simulations demonstrate that the benefit of insulation is greatest when all of the hot water uses are spaced apart from 10 to 30 minutes; however, this is not typically how hot water is consumed in a home. The benefit of insulation is diminished with shorter and longer time between uses.

It was shown in the study that pipes located in colder locations such as an unconditioned crawl space, benefit more from pipe insulation than pipes located in more conditioned spaces. This is why the insulation requirement was not changed for hot water pipes outside conditioned space.

Plastic pipe was shown to have less loss than copper pipe and commensurately insulation is more beneficial on metal pipe than on plastic pipe. However, copper pipe is losing market share and currently is only being installed in 14% of new homes.

Sources:

NAHB Research Center (2010), *Domestic Hot Water System Piping Insulation: Analysis of Benefits and Cost*
Hendron, R. Burch, J. Hoeschele, M. Rainer, L. (2009), *Potential for Energy Savings Through Residential Hot Water Distribution System Improvements*, Proceedings of the 3rd International Conference on Energy Sustainability

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

R403.4.2-EC-SURRENA.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Proponent requested disapproval based upon action on RE129-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality representing himself requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping ~~larger than~~ 3/4 inch <u>and larger in</u> nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping located outside the conditioned space.
4. Piping from the water heater to a distribution manifold.
5. Piping located under a floor slab.
6. Buried piping.
7. Supply and return piping in recirculation systems other than demand recirculation systems.

Commenter's Reason: This would not require pipe insulation on most pipes where the use of hot water is only occasional, but would retain the pipe insulation on the main lines (3/4 inch and larger) where the insulation is of more value because the flow of hot water is much more frequent. At least some portion of the pipe run to kitchens and bathrooms is likely to be 3/4 and larger and this is the piping that is most likely to have the highest number of uses because it is being shared by more plumbing fixtures. Specifying a requirement based on pipe size, rather than where the pipe leads to, is clearer and easier to inspect. This comment retains RE132's simplicity by eliminating the table based on pipe length.

RE132-13

Final Action: AS AM AMPC____ D

RE133-13
R403.4.2 (IRC N1103.4.2)

Proposed Change as Submitted

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. ~~Piping larger than 3/4 inch nominal diameter.~~
~~2.~~ 1. Piping serving more than one dwelling unit.
~~3.~~ 2. Piping from the water heater to kitchen outlets.
~~4.~~ 3. Piping located outside the conditioned space.
~~5.~~ 4. Piping from the water heater to a distribution manifold.
~~6.~~ 5. Piping located under a floor slab.
~~7.~~ 6. Buried piping.
~~8.~~ 7. Supply and return piping in recirculation systems other than demand recirculation systems.
~~9.~~ 8. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Reason: Insulation requirements for ¾-in piping are currently inconsistent between the list in Section R403.4.2 and Table R403.4.2. Eliminating the list item eliminates the ambiguity.

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

R403.4.2-EC-WILLIAMS.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Proponent requested disapproval based upon action on RE129-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy requests Approval as Modified by this Public Comment

Modify the proposal as follows:

R403.4.2 Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
~~1~~ 2. Piping serving more than one dwelling unit.
~~2~~ 3. Piping from the water heater to kitchen outlets.

~~3~~ 4. Piping located outside the conditioned space.
~~4~~ 5. Piping from the water heater to a distribution manifold.
~~5~~ 6. Piping located under a floor slab.
~~6~~ 7. Buried piping.
~~7~~ 8. Supply and return piping in recirculation systems other than demand recirculation systems.
~~8~~ 9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

TABLE R403.4.2 Maximum Run Length (feet)[1]

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (in.)	3/8	1/2	3/4	~~> 3/4~~
Maximum Run Length	30	20	10	~~5~~

Commenter's Reason: Insulation requirements for ¾-inch piping are currently inconsistent between the list in Section R403.4.2 and Table R403.4.2. This public comment eliminates the column in the table for pipe diameters of greater than ¾-inch, and therefore removes the ambiguity. This proposal was disapproved at the code action hearings only because DOE asked the committee for disapproval, since another proposal correcting the inconsistency was approved. DOE will withdraw this proposal if other proposals that fix this inconsistency are approved at the final action hearings.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

RE133-13

Final Action: AS AM AMPC____ D

RE136-13, Part I

R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), IPC 202, IPC [E]607.2.1.1 (NEW), IRC P2905 (NEW), IRC P2905.1 (NEW)

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART I – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (IRC N1101.4.2) Demand recirculation systems. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC).

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

R403.4.2 (NEW) #1-EC-KLEIN

Committee Action Hearing Results

PART I – IECC – Residential

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarity on how demand recirculation systems that return water though a cold water pipe back to the source should operate.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: The proposal provides clarity on how demand recirculation systems that return water though a cold water pipe back to the source should operate.

I agree with the Committee's reason and urge your support of this proposal.

Public Comment 2:

Greg Towsley, Grundfos representing self, requests As Modified by this Public Comment.

Modify the proposal as follows:

R403.4.2 (IRC N1101.4.2) Demand recirculation systems. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture<u>,</u> or sensing the flow of hot or tempered water to a fixture fitting or appliance.

2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature <u>of the water</u> entering the cold water piping ~~102ºF (38.9 ºC)~~ <u>104°F (40°C)</u>.

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

RE136-13, Part 1

Final Action: AS AM AMPC____ D

RE136-13, Part II

Proposed Change as Submitted

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART II – IPC

Add new definition as follows:

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one more pumps prime the service hot water piping with heated water upon demand for hot water.

Add new text as follows:

[E] 607.2.1.1 Demand recirculation controls. This section shall apply only to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.

2. The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC).

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67

Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

R403.4.2 (NEW) #1-EC-KLEIN

Committee Action Hearing Results

PART II – IPC

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarity on how demand recirculation systems that return water though a cold water pipe back to the source should operate.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: I agree with the Committee's reason and urge your support of this proposal.

Public Comment 2:

Greg Towsley, Grundfos representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[E] 607.2.1.1 Demand recirculation controls. This section shall apply only to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.

2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature of the water entering the cold water piping to ~~102ºF (38.9 ºC)~~ 104°F (40°C).

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

RE136-13, Part II

Final Action: AS AM AMPC____ D

RE136-13, Part III

Proposed Change as Submitted

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Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART III – IRC-P

Add new text as follows:

SECTION P2905
HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Demand recirculation systems. *Demand recirculation water systems* shall be in accordance with Section N1103.4.2.

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

R403.4.2 (NEW) #1-EC-KLEIN

Committee Action Hearing Results

PART III – IRC – Plumbing
Committee Action: **Disapproved**

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: The Committee disapproved the code change because they felt there was no need of a pointer to another section in the IRC. This pointer section is only SUGGESTING A SIMPLIFICATION**-** Current design solutions customarily recirculate the hot water loop return directly back to the water heater with a dedicated return line. Allowing the cold water supply to be temporarily used as the return line reduces the costs of installing recirculation systems. This strategy was recognized by the Residential and Commercial Energy Committees, but only happens if the plumbing system design/installation is coordinated to achieve this result. There is therefore, a need for a pointer to the requirement.

I urge your support of this comment.

RE136-13, Part III
Final Action: AS AM AMPC____ D

RE137-13, Part 1

R202 (IRC N1101.9), R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), Table R403.4.2.1 (NEW) (IRC Table N1103.4.2.1 (NEW)), R403.4.2.2 (NEW) (IRC N1103.4.2.2 (NEW)), R403.4.2.2.1 (NEW) (IRC N1103.4.2.2.1 (NEW)), IRC P2905 (NEW), IRC P2905.1 (NEW)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I-IECC RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (IRC N1103.4.2) Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section R403.4.2.1 or Section R403.4.2.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

R403.4.2.1 (IRC N1103.4.2.1) Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe for *plumbing fixtures* and *plumbing appliances* shall be in accordance with the maximum piping length column~~s~~ in Table R403.4.2.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table R403.4.2.1.

TABLE R403.4.2.1 (IRC TABLE N1103.4.2.1)
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		WATER FROM A WATER HEATER	WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE
1/4	0.33	50	50
5/16	0.5	50	48
3/8	0.75	50	32
1/2	1.5	43	16
5/8	2	32	12
3/4	3	21	8
7/8	4	16	6
1	5	13	5
1 ¼	8	8	3
1 ½	11	6	2
2 or larger	18	4	1

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

R403.4.2.2 (IRC N1103.4.2.2) Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or *plumbing appliance* shall be 0.5 gallon (1.89 L) where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.

R403.4.2.2.1 (IRC N1103.4.2.2.1) Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table R403.4.2.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Reason: This change speeds hot water to the user, saves energy and water, and potentially lowers construction costs. All these are accomplished by limiting the volume of water in the pipes.

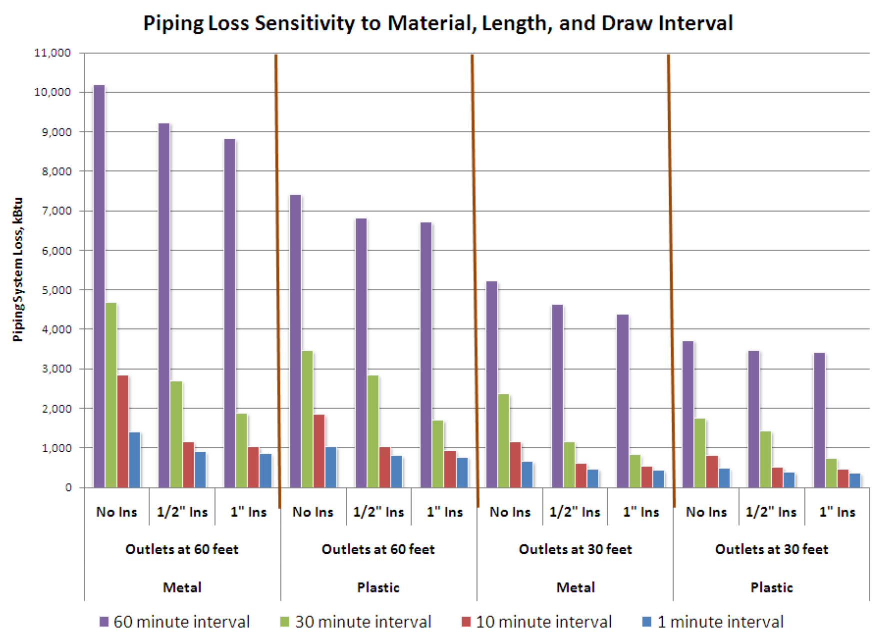
We have all have turned on the hot water and waited for it to get hot. While we wait water runs down the drain, wasting clean water. While we wait, our time is wasted. When we are done there is still hot water in the pipes, water which cools thereby wasting as much energy as it took to heat the water in the pipes. Pipes with larger volumes take longer to fill, waste more and are potentially more expensive to build.

This proposal remedies the problems above by reducing the water volume between the source of heated water and the use. The first method (Section R403.4.2.1) requires no calculation; it limits the water volume in the pipes by limiting the pipe length. The second option (Section R403.4.2.1) requires a calculation of volume in the pipes, but provides a table that translates the pipe length into a volume (columns 1 and 2); and provides quick options for different pipe assumptions in columns 3 and 4.

In simple form, cutting the volume in half: cuts the wait time in half, cuts the clean water wasted down the drain in half, cuts the energy loss while water goes through the pipes in half, and cuts the loss of energy from hot water left in the pipes after use in half.

A 2010 study done by the National Association of Home Builders Research Center shows the big impact of reducing hot water pipe volume. Figure 1, from that study, is below. The left half is for pipe 60 feet long. The right half is for pipe 30 feet long. Pick any case on the left and compare it to the same case on the right. Note there is always about a 50% reduction in piping energy lost in the 30-foot case. An example from the figure below, the energy loss of an uninsulated metal pipe 60 feet long drops from just over 10,000 kBtu to just over 5,000 kBtu for a pipe 30 feet long. Similarly uninsulated plastic pipe drops from about 7,300 kBtu to about 3,700 kBtu. The same pattern of reduction occurs when the piping is insulated.

Figure 1 Pipe Loss Comparison Using Parametric Analysis



Source: Domestic Hot Water System Piping Insulation: Analysis of Benefits and Costs, Figure 4, page 10 of 24, NAHB Research Center, December 2010.

Why is the maximum volume 0.5 gallon when the source of heated water is a water heater? So that following standard practice for plumbing engineers and meeting the minimum requirements in the energy code will be aligned. At present, they are not, with the result that hot water delivery times are greater than 30 seconds after the tap is opened; unacceptable performance according to the American Society of Plumbing Engineers.

Why is the maximum volume 0.19 gallon when the source of heated water is a circulation loop or heat-traced pipe? In exchange for the flexibility in the location of the water heater relative to the plumbing fixtures and plumbing appliances, the allowable volume that will be wasted has been reduced and the time-to-tap improved so that it will almost always fall into ASPE's range for Acceptable Performance.

The definition proposed is used in both the IRC and the IPC.

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: There are several ways to meet the requirements of this proposal, many of which cost less than current piping practices. I would recommend that builders and developers select one of the less expensive methods.

R403.4.2 #2 (NEW)-EC-KLEIN

Committee Action Hearing Results

PART I – IECC – Residential

Committee Action: Disapproved

Committee Reason: The proponents and opponents of RE122 are going to work together to bring that proposal, revised, forward in the public comment period. This proposal is disapproved in favor of the RE-122 being reworked and brought back at final action.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the Proposal as follows:

R403.4.2.2 (IRC N1103.4.2.2) Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1. The maximum volume to the *plumbing fixtures* and *plumbing appliances* shall be 64 ounces (1.89 L) ~~where~~ from the source of heated water. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water. ~~is a water heater; and 24 ounces (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.~~

TABLE R403.4.2 (IRC TABLE N1103.4.2)
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		~~WATER FROM A WATER HEATER~~	~~WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE~~
1/4	0.33	50	~~50~~
5/16	0.5	50	~~48~~
3/8	0.75	50	~~32~~
1/2	1.5	43	~~16~~
5/8	2	32	~~12~~
3/4	3	21	~~8~~
7/8	4	16	~~6~~
1	5	13	~~5~~
1 ¼	8	8	~~3~~
1 ½	11	6	~~2~~
2 or larger	18	4	~~1~~

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

Commenter's Reason: As agreed at the hearing, I have been working with the proponents of RE122 to revise that proposal for consideration at the FAH.

However, this proposal as originally submitted provides, what I believe is, a simpler, more inclusive method of achieving a similar result to what RE122 does. It is simpler because it provides one volume amount for all plumbing materials with the same nominal pipe diameter. This also makes it more inclusive when new piping materials are added to the code. It is also simpler because a maximum length for each nominal diameter has been provided for use by contractors and code officials; it will not always be necessary to calculate the volume. It will only be necessary to verify the nominal diameter and the length.

The purpose of the original proposal is to provide better hot water service to the occupants of our buildings. We have all experienced the problem of waiting for hot water to arrive at plumbing fixtures. Installing the hot water piping so that the delivery system is more efficient will stay with the building for 50-100 years. Similarly, the pain of an inefficient system will last just as long.

I have further simplified the original proposal based on feedback given by the IECC-CE Committee. There is now only one maximum length column. Now, the length (and the volume) from all sources of heated water to any plumbing fixture or appliance is the same.

I urge your support of either this public comment or support of RE122.

Public Comment 2:

Ryan Meres, Institute for Market Transformation, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.4.2 (IRC N1103.4.2) Efficient heated water supply piping. <u>From the nearest source of heated water to a plumbing fixture or plumbing appliance, the developed length of the piping shall not exceed 50 feet (15240 mm); or the piping length shall limit the time for heated water to arrive at its destination to not more than 30 seconds when the fixture or appliance is turned on to full hot, whichever is less. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water.</u> ~~Heated water supply piping shall be in accordance with Section R403.4.2.1 or Section R403.4.2.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).~~

~~**R403.4.2.1 (IRC N1103.4.2.1) Maximum allowable pipe length method**. The maximum allowable piping length from the source of heated water to the termination of the fixture supply pipe shall be in accordance with the maximum piping length columns in Table R403.4.2. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table R403.4.2.~~

~~**R403.4.2.2 (IRC N1103.4.2.2) Maximum allowable pipe volume method**. The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1. The maximum volume to the *plumbing fixtures* and *plumbing appliances* shall be 64 ounces (1.89 L) where~~ ~~<u>from</u>~~ ~~the source of heated water.is a water heater; and 24 ounces (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.~~

~~**R403.4.2.2.1 (IRC N1103.4.2.2.1) Water volume determination**. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table R403.4.2. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.~~

~~**TABLE R403.4.2 ((IRC TABLE N1103.4.2)**~~
~~**PIPING VOLUME AND MAXIMUM PIPING LENGTHS**~~

Add new definition:

<u>**WATER HEATER.** Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.</u>

Commenter's Reason: As agreed at the hearing, we have been working with the proponents of RE122 to revise that proposal for consideration at the FAH.

At this time, hot water distribution systems in residential buildings are not required to limit the length between the source of hot water and the plumbing fixtures and plumbing appliances. In contrast, commercial buildings are required to limit the length to 50 feet of developed length in accordance with provisions in the IPC.

However, meeting the maximum length provision does not ensure that hot water will arrive at fixtures in a timely manner. It also wastes energy. It also means that plumbing engineers cannot meet their standards of practice.

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. We have all experienced the problem of waiting for hot water to arrive at plumbing fixtures. Installing the hot water piping so that the delivery system is more efficient will stay with the building for 50-100 years. Similarly, the pain of an inefficient system will last just as long.

This proposal brings the length limitation from the IPC into the IECC. Since most of the buildings in the occupancies governed by IECC-RE generally have a smaller footprint that those that use IECC-CE, it should be easier for them to bring the uses within 50 feet of the sources of hot water. The proposal adds the provision that the hot water supply shall deliver hot water within 30 seconds after the plumbing fixture has been turned on. This provision is in line with the marginal performance standards of practice for plumbing engineers (See the orange row in Figure 1).

Figure 1. ASPE Time-to-Tap Performance Criteria

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Most plumbing fixtures and plumbing appliances in residential occupancies operate from 1 – 2.5 gpm. Figure 2 shows that the volume in the piping will be a maximum of 64 ounces for plumbing fixtures with these flow rates. When flow rates are lower, the volume needs to be smaller.

Figure 2 Comparing Pipe Volume, Plumbing Fixture Flow Rate and the Time-to-Tap

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

The changes in this comment simplify the proposal by reducing the perceived complexity of having a table and also by making the requirements the same for all sources of hot water.

We urge your support.

RE137-13, Part I

Final Action: AS AM AMPC____ D

RE137-13, Part II

R202 (IRC N1101.9), R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), Table R403.4.2.1 (NEW) (IRC Table N1103.4.2.1 (NEW)), R403.4.2.2 (NEW) (IRC N1103.4.2.2 (NEW)), R403.4.2.2.1 (NEW) (IRC N1103.4.2.2.1 (NEW)), IRC P2905 (NEW), IRC P2905.1 (NEW)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II IRC-P

Add new text as follows:

SECTION P2905
HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Heated water supply piping. Heated water supply piping shall be in accordance with Section N1103.4.2.

Reason: This change speeds hot water to the user, saves energy and water, and potentially lowers construction costs. All these are accomplished by limiting the volume of water in the pipes.

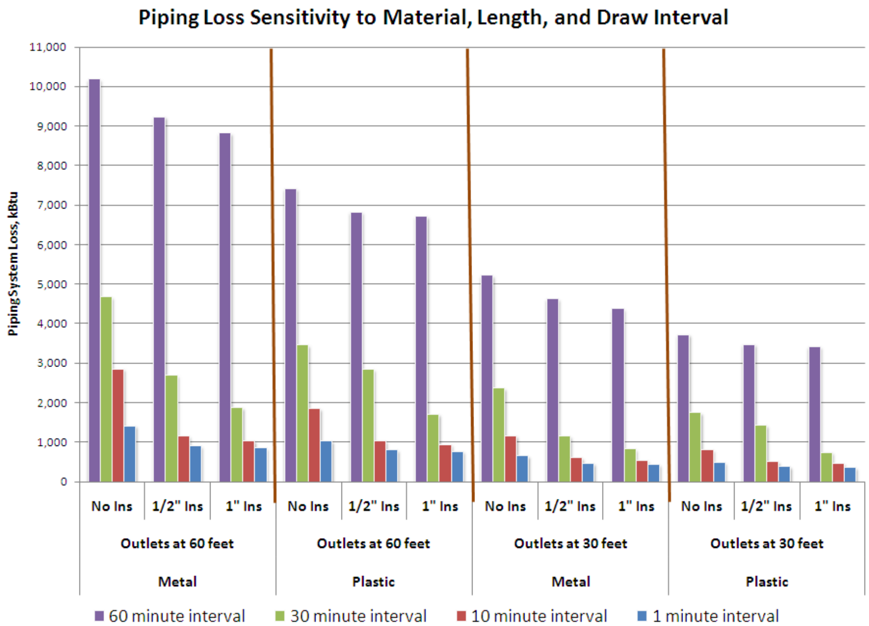
We have all have turned on the hot water and waited for it to get hot. While we wait water runs down the drain, wasting clean water. While we wait, our time is wasted. When we are done there is still hot water in the pipes, water which cools thereby wasting as much energy as it took to heat the water in the pipes. Pipes with larger volumes take longer to fill, waste more and are potentially more expensive to build.

This proposal remedies the problems above by reducing the water volume between the source of heated water and the use. The first method (Section R403.4.2.1) requires no calculation; it limits the water volume in the pipes by limiting the pipe length. The second option (Section R403.4.2.1) requires a calculation of volume in the pipes, but provides a table that translates the pipe length into a volume (columns 1 and 2); and provides quick options for different pipe assumptions in columns 3 and 4.

In simple form, cutting the volume in half: cuts the wait time in half, cuts the clean water wasted down the drain in half, cuts the energy loss while water goes through the pipes in half, and cuts the loss of energy from hot water left in the pipes after use in half.

A 2010 study done by the National Association of Home Builders Research Center shows the big impact of reducing hot water pipe volume. Figure 1, from that study, is below. The left half is for pipe 60 feet long. The right half is for pipe 30 feet long. Pick any case on the left and compare it to the same case on the right. Note there is always about a 50% reduction in piping energy lost in the 30-foot case. An example from the figure below, the energy loss of an uninsulated metal pipe 60 feet long drops from just over 10,000 kBtu to just over 5,000 kBtu for a pipe 30 feet long. Similarly uninsulated plastic pipe drops from about 7,300 kBtu to about 3,700 kBtu. The same pattern of reduction occurs when the piping is insulated.

Figure 1 Pipe Loss Comparison Using Parametric Analysis



Source: Domestic Hot Water System Piping Insulation: Analysis of Benefits and Costs, Figure 4, page 10 of 24, NAHB Research Center, December 2010.

Why is the maximum volume 0.5 gallon when the source of heated water is a water heater? So that following standard practice for plumbing engineers and meeting the minimum requirements in the energy code will be aligned. At present, they are not, with the result that hot water delivery times are greater than 30 seconds after the tap is opened; unacceptable performance according to the American Society of Plumbing Engineers.

Why is the maximum volume 0.19 gallon when the source of heated water is a circulation loop or heat-traced pipe? In exchange for the flexibility in the location of the water heater relative to the plumbing fixtures and plumbing appliances, the allowable volume that will be wasted has been reduced and the time-to-tap improved so that it will almost always fall into ASPE's range for Acceptable Performance.

The definition proposed is used in both the IRC and the IPC.

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: There are several ways to meet the requirements of this proposal, many of which cost less than current piping practices. I would recommend that builders and developers select one of the less expensive methods.

R403.4.2 #2 (NEW)-EC-KLEIN

Committee Action Hearing Results

PART II – IRC – Plumbing
Committee Action: Disapproved

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: The Committee disapproved the code change because they felt there was no need of a pointer to another section in the IRC.

I am asking you to approve the proposal as originally submitted because I am concerned that if this doesn't pass, are the plumbers, builders and code officials in your jurisdiction going to realize that something in the energy code section of the IRC is going to affect their work?

I urge your support of this comment.

RE137-13, Part II

Final Action: AS AM AMPC____ D

RE138-13, Part I

R202 (IRC N1101.9), R403.4.2 (New) (IRC N1103.4.2 (New)), R403.4.2.1 (New) (IRC N1103.4.2.1 (New)), Table R403.4.2.1 (New) (IRC N1103.4.2.1 (New)), R403.4.2.2 (New) (IRC N1103.4.2.2 (New)), R403.4.2.2.1 (New) (IRC N1103.4.2.2.1 (New)), IRC P2905 (New), IRC P2905.1 (New)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (N1103.4.2) Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section R403.4.2.1 or Section R403.4.2.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

R403.4.2.1 (N1103.4.2.1) Maximum allowable pipe length method. The maximum piping length from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be in accordance with the maximum piping length column~~s~~ in Table R403.4.2. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table R403.4.2.1.

TABLE R403.4.2.1 (N1103.4.2.1)
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)
		LAVATORY FAUCETS—PUBLIC
1/4	0.33	6
5/16	0.5	4
3/8	0.75	3
1/2	1.5	2
5/8	2	1
3/4	3	0.5
7/8	4	0.5
1	5	0.5
1 ¼	8	0.5
1 ½	11	0.5
2 or larger	18	0.5

For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

R403.4.2.2 (N1103.4.2.2) Maximum allowable pipe volume method. The maximum piping volume from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be 2 ounces (0.06 L). The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1.

R403.4.2.2.1 (N1103.4.2.2.1) Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table R403.4.2.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Reason: The problem of heated water taking an excessively long time to arrive at lavatory faucets in public restrooms is well known. The length of time the faucets are used during each hand washing event is very short, often around 5 seconds. Federal law requires low flow rate or small, metered volumes for the faucets in these applications. Health codes expect heated water for washing hands in these applications. The dilemma is that the volume of not-hot water in the piping from the source of hot water to the faucets is much too large for the heated water to arrive in a timely fashion; even at the 50-foot limit currently required in the 2012 IPC. Supporting this proposal will correlate the IECC with Federal law and local health codes by providing heated water for hand washing in a timely matter.

The delivery of hot water to public lavatory faucets needs to be considered separately because of potential health issues. The events are short and the flow rates are low. Table 1 shows the time-to-tap performance based on the requirements in the proposal. The 0.25 and 0.5 gpm columns are typical of the flow rates for public lavatory faucets. The volume in the pipe was chosen so that heated water would arrive in the first part of the hot water event so that every person who uses the public lavatory will have the benefits of hot water.

Table 1 Time-to-Tap Performance when the Volume in the Piping from the Source to the Use is 2 ounces

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	3.8	1.9	0.9	0.6	0.5	0.4

The energy savings comes from not losing the heat from the water as it tries to arrive at the faucets.

For more information and background on issues related to hot water distribution please read the 4-part series at: http://www.allianceforwaterefficiency.org/Residential_Hot_Water_Distribution_System_Introduction.aspx

Cost impact: There are several ways to meet the requirements of this proposal, some of which cost less than current heated water system practices. I would recommend that builders and developers select one of the less expensive methods.

R403.4.2 #3 (New)-EC-KLEIN

Committee Action Hearing Results

PART I – IECC – Residential

Committee Action: **Disapproved**

Committee Reason: This is a similar proposal to RE137. Point of use water heaters could be used to solve the problem that this proposal is trying to solve.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted and public comments were received.

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self,requests Approval as Submitted.

Commenter's Reason: The Committee disapproved this proposal saying that point of use water heaters could be used to solve the problem that this proposal is trying to solve.

The committee was correct. Point-of-use water heaters are <u>one</u> of the possible solutions to the problem we have all encountered: not getting hot or tempered water to wash our hands in public restrooms. This proposal requires that, regardless of the method used to heat the water – including point-of-use water heaters – the volume between the source of hot water and the public lavatory faucets must be small. This is to ensure that heated water is actually delivered to the faucets for every user.

We urge your support of the Assembly Action and approve this code change.

Public Comment 2:

Ryan Meres, Institute for Market Transformation, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.4.2 (IRC N1103.4.2) Efficient heated water supply piping. <u>From the nearest source of heated water to a public lavatory faucet, the time for heated water to arrive at its destination shall not exceed 5 seconds when the faucet is turned on to full hot or for hands-free faucets, with the mixing valve set to the specified outlet temperature. Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water.</u> ~~Heated water supply piping shall be in accordance with Section R403.4.2.1 or Section R403.4.2.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).~~

~~**R403.4.2.1 (IRC N1103.4.2.1) Maximum allowable pipe length method**. The maximum allowable piping length from the source of hot or tempered water to the termination of the fixture supply pipe shall be in accordance with the maximum piping length columns in Table R403.4.2. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table R403.4.2.~~

~~**R403.4.2.2 (IRC N1103.4.2.2) Maximum allowable pipe volume method**. The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1. The maximum volume of water in the piping from the source of heated water to public lavatory faucets, metering or non-metering, shall be 2 ounces (0.06 L).~~

~~**R403.4.2.2.1 (IRC N1103.4.2.2.1) Water volume determination**. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table R403.4.2. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.~~

~~**TABLE R403.4.2 ((IRC TABLE N1103.4.2)**~~
~~**PIPING VOLUME AND MAXIMUM PIPING LENGTHS**~~

Add new definition:

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Commenter's Reason: The Committee disapproved this proposal saying that point of use water heaters could be used to solve the problem that this proposal is trying to solve.

This proposal focuses on the delivery of heated water to <u>public lavatory faucets</u> a problem all of us are familiar with.
The committee was correct. Point-of-use water heaters are <u>one</u> of the possible solutions to the problem we have all encountered: not getting hot or tempered water to wash our hands in public restrooms.

Current plumbing practice results in a significant waste of energy, without actually providing the intended or code required (health) service. The energy waste occurs when the water in the branches and fixture supplies cools down between the intermittent uses that occur in public bathrooms. The solution is to limit the volume between the source of heated water and the faucets or the time-to-tap for hot water to arrive after the faucet is turned on.

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. Installing the hot water piping so that the delivery is more efficient will stay with the building for 50-100 years. Similarly the pain of an inefficient system will last just as long.

This comment simplifies the original proposal by saying that the hot water supply piping shall deliver hot water within 5 seconds after the public lavatory faucet has been turned on. This time limit is important because the actual amount of time a public lavatory faucet is used is generally less than 10 seconds. It only makes sense to have a code that delivers hot water in the first portion of the short event. This revised code section is now in line with the acceptable performance standards of practice for plumbing engineers (See the green row in Figure 1).

Figure 1. ASPE Time-to-Tap Performance Criteria

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Public lavatory faucets are a special case in the code as their flow rate is generally 0.5 gpm or less. However, since most public lavatory faucets are hands-free, the hot water portion of the mix is closer to 0.25 gpm. Figure 2 shows that the volume in the piping needs to be small for the heated water to arrive quickly at the faucets.

Figure 2 Comparing Pipe Volume, Plumbing Fixture Flow Rate and the Time-to-Tap

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

The changes in this comment simplify the proposal by reducing the complexity of having a table.

We urge your support.

RE138-13, Part I

Final Action: AS AM AMPC____ D

RE138-13, Part II

R202 (IRC N1101.9), R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), Table R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), R403.4.2.2 (NEW) (IRC N1103.4.2.2 (NEW)), R403.4.2.2.1 (NEW) (IRC N1103.4.2.2.1 (NEW)), IRC P2905 (NEW), IRC P2905.1 (NEW)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II-IRC-P

Add new text as follows:

SECTION P2905
HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Heated water supply piping. Heated water supply piping shall be in accordance with Section N1103.4.2.

Reason: The problem of heated water taking an excessively long time to arrive at lavatory faucets in public restrooms is well known. The length of time the faucets are used during each hand washing event is very short, often around 5 seconds. Federal law requires low flow rate or small, metered volumes for the faucets in these applications. Health codes expect heated water for washing hands in these applications. The dilemma is that the volume of not-hot water in the piping from the source of hot water to the faucets is much too large for the heated water to arrive in a timely fashion; even at the 50-foot limit currently required in the 2012 IPC. Supporting this proposal will correlate the IECC with Federal law and local health codes by providing heated water for hand washing in a timely matter.

The delivery of hot water to public lavatory faucets needs to be considered separately because of potential health issues. The events are short and the flow rates are low. Table 1 shows the time-to-tap performance based on the requirements in the proposal. The 0.25 and 0.5 gpm columns are typical of the flow rates for public lavatory faucets. The volume in the pipe was chosen so that heated water would arrive in the first part of the hot water event so that every person who uses the public lavatory will have the benefits of hot water.

Table 1 Time-to-Tap Performance when the Volume in the Piping from the Source to the Use is 2 ounces

Volume in the Pipe (ounces)	~~Minimum~~ Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	3.8	1.9	0.9	0.6	0.5	0.4

The energy savings comes from not losing the heat from the water as it tries to arrive at the faucets.

For more information and background on issues related to hot water distribution please read the 4-part series at: http://www.allianceforwaterefficiency.org/Residential_Hot_Water_Distribution_System_Introduction.aspx

Cost impact: There are several ways to meet the requirements of this proposal, some of which cost less than current heated water system practices. I would recommend that builders and developers select one of the less expensive methods.

R403.4.2 #3 (NEW)-EC-KLEIN

Committee Action Hearing Results

PART II – IRC – Plumbing

Committee Action: **Disapproved**

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Submitted.

Commenter's Reason: The Committee disapproved the code change because they felt there was no need of a pointer to another section in the IRC.

I am asking you to approve the proposal as originally submitted because I am concerned that if this doesn't pass, are the plumbers, builders and code officials in your jurisdiction going to realize that something in the energy code section of the IRC is going to affect their work?

I urge your support of this comment.

RE138-13, Part II

Final Action: AS AM AMPC____ D

RE143-13
R403.6 (IRC N1103.6)

Proposed Change as Submitted

Proponent: Philip Debes, Dan Deen, Steve Frazer, Lloyd Larkin, Allan Tyson, Jim Walker, all of P and N Distribution, Inc. representing themselves. Clifton Payne of DNV KEMA (Det Norske Veritas and Keuring Elektrotechnische Materialen Arnhem) Energy and Sustainability, representing Energy Design Systems, Philip Jeffers, Energy Design Systems, Inc, representing self, Scott Miller, Knauf Insulation representing self

Revise as follows:

R403.6 (N1103.6) Equipment Sizing (Mandatory). Heating and cooling equipment shall be sized in accordance with ~~ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies.~~ standard engineering heat loss and heat gain formulas coupled with appropriate weather data, home construction materials and other considerations normally used in the HVAC industry.

Reasons:

[DEBES, DEEN, FRAZER, LARKIN, TYSON, WALKER] ACCA Manual J and ACCA Manual S are trademarks. Code officials mistakenly believe ACCA is the certifying agent for IECC code compliance. ACCA charges royalties for ACCA approved software and resells software directly to contractors. ACCA is an HVAC software competitor, not a certifying authority.

[PAYNE] ACCA Manual J and ACCA Manual S are trademarks. ACCA is not the certifying agent for IECC code compliance, as ACCA Code officials appear to mistakenly believe. ACCA charges royalties for ACCA approved software and resells software directly to contractors. ACCA is an HVAC software competitor, not a certifying authority. By referencing ACCA in R403.6, the IECC would be selecting and endorsing one product from the marketplace over overs, not simply providing a standard that should be used to size HVAC equipment. This would create an unlevel playing field by providing ACCA with a competitive advantage.

[JEFFERS]
1. ACCA Manual J and ACCA Manual S are trademarks. ACCA and ACCA's software partners are using the IECC code to intimidate contractors. See attachment 1: ACCA "Contractors Beware", See attachment 2: Bob Volin, ACCA Code Committee Member, Photo Shopping his Letterhead onto the Code's Section R403.6 and convincing contractors into buying "ACCA Approved Software" and trying to force software developers into royalty payments totaling millions of dollars. ACCA is restraining trade, eliminating competition, and inhibiting development of more accurate software and procedures. Building Inspectors mistakenly interpret "in accordance with" to mean "approved by". ACCA uses this fact to create a de-facto IECC software certification process, making millions in fees, royalties, and reselling the software ACCA "approves". ACCA is a software competitor and Section R403.6 creates unfair competition.

2. For existing houses ACCA's Manual J procedure has no relationship to any sound engineering practice. None of the inputs such as a home's leakage rate, duct loss/gain, or any other value are known, and these inputs can have wide tolerances. Contractors use inputs that give them the answers they want. This is called confirmation Bias. An ACCA load calculation on an existing house is no different from guessing the size. The fact that contractors work ACCA's procedure backwards is widely known in the HVAC industry. ACCA load calculations average 140% of operating loads and can contribute to comfort, health, safety issues, and dramatically overstate energy usage.

> "they simply change some of the inputs to make the procedure spit out answer they're comfortable with and no one questions their answers." - Hank Rutkowski P.E. Author ACCA Manual J.

3. There is no evidence what so ever that "proper sizing" saves energy.

ATTACHMENT #1

From: Melissa Broadus, ACCA [mailto:melissa.broadus@acca.org]
Sent: Tuesday, September 06, 2011 2:40 PM
To: don@donwestcooling.com
Subject: ACCA NEWS: Contractors: Beware of Inappropriate Load Calculation Software

For Immediate Release

September 6, 2011
Media Contact: Melissa Broadus, 703-575-4477 melissa.broadus@acca.org

Contractors: Beware of Inappropriate Load Calculation Software

Manual J ® is the ANSI-approved national standard for determining residential load calculations for HVACR systems, and is required by many building codes and regulations. It is produced by the Air Conditioning Contractors of America (ACCA), the nation's largest association of indoor environmental systems professionals.

Given the complexities of modern construction, contractors and design professionals are encouraged to use software for accurate system design. However, not all load calculation software is created equal.

ACCA is reminding contractors that only those software programs that have been approved and licensed by ACCA as "Powered by Manual J ®" can be considered in compliance with codes and regulations requiring the use of Manual J ®.

As of today, the only software programs that meet the requirements for Manual J ® load calculations are:

- **RHVAC Residential Load Calculation from Elite Software**
- **Right – J from Wrightsoft**
- **AccuLoads from ADTEK Software Company**
- **Florida Solar Energy Center's EnergyGauge**

Any other software program, online service or mobile application cannot be considered to be compliant with the Manual J ® standard and should not be used where Manual J ® is required. Use of non-authorized software may pose a liability for the contractor that installs the system.

For more information on Manual J ®, the ACCA system design process, and load calculation software, visit https://www.acca.org/industry/system-design.

Software providers interested in applying for validation and licensing of their product should contact Glenn Hourahan at glenn.hourahan@acca.org.

Manual J ® is a registered federal trademark of the Air Conditioning Contractors of America.

The Air Conditioning Contractors of America (ACCA) is a non-profit association serving more than 60,000 professionals and 4,000 businesses in the HVACR community, who work together to promote professional contracting, energy efficiency, and healthy, comfortable indoor environments for all Americans. For more information, visit www.acca.org.

Air Conditioning Contractors of America 2800 Shirlington Road, Suite 300 | Arlington, VA 22206 | 703-575-4477 | www.acca.org

ATTACHMENT #2

Air Design Concepts, Inc.

Contractors: Beware of Inappropriate Load Calculation Software

Contractor Alert!

By now most you know as of March 15th 2012 load calculation will be required on

ALL AC CHANGE OUTS.

101.4.7.1.2 Replacement equipment sizing **(mandatory)**. An A/C contractor or licensed Florida PE shall submit a nationally recognized method based sizing calculation to the code official at the time of permit application for total replacement of the condensing and evaporator components of HVAC systems in accordance with Florida law and the provisions of Section **403.6.1**or Section **503.2.1**.as applicable.

403.6 Heating and cooling equipment (Mandatory).

403.6.1 Equipment sizing. Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on the equipment loads calculated in accordance with **Manual J or other approved heating and cooling calculation methodologies,** based on building loads for the directional orientation of the building. The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described in Section 302.1. This Code does not allow designer safety factors, provisions for future expansion or other factors which affect equipment sizing.

Approved methodologies by Florida code

- ACCA Manual J
- ASHRAE
- Florida PE

Manual J ® is the ANSI-approved national standard for estimating residential heating and cooling loads for HVACR systems. It is the reference cited in both national model building codes. Authorities having jurisdiction (AHJ) may approve alternative methods of load calculation, however, most AHJs recognized Manual J8 due to its long history and wide acceptance in the HVAC industry. Manual J is produced by the Air Conditioning Contractors of America (ACCA), the nation's largest association of indoor environmental systems professionals.

Given the complexities of modeling modern construction, HVAC contractors and other design professionals are encouraged to use software for accurate system design. However, not all load calculation software is created equal. ACCA is reminding contractors that only those software programs that have been approved and licensed by ACCA as "Powered by Manual J ®" can be considered compliant with the procedure referenced in the model codes.

As of today, the only software programs that meet the requirements for Manual J ® load calculations are:

- **RHVAC Residential Load Calculation from Elite Software**
- **Right – J from Wrightsoft**
- **AccuLoads from ADTEK Software Company**
- **Florida Solar Energy Center's EnergyGauge**

Any other software program, online service or mobile application, or stating they are based upon, cannot be considered to be compliant with the Manual J ® standard and should not be used where Manual J ® is required. Use of non-authorized software may pose a liability for the contractor that represents that they have complied with the Manual J® procedures.

[MILLER] ACCA Manual J and ACCA Manual S are trademarks. Code officials mistakenly believe ACCA is the certifying agent for IECC code compliance. ACCA charges royalties for ACCA approved software and resells software directly to contractors. ACCA is an HVAC software competitor, not a certifying authority.

ACCA Manual S and Manual J are trademarks of ACCA. According to ACCA, all software must be approved by ACCA or it does not comply with the intent of the IECC R-code and there are significant fees associated with the ACCA approval process. From the following link demonstrates that ACCA believes it has authority to appraise and charge a fee to other software developers for all software used in the IECC 2012 load calculation process:

https://www.acca.org/archives/news-and-media/news-room/press-releases/5524

The contents of the above link are as follows and the highlighted portion should be considered problematic from a trade restriction standpoint. It can be proven that this position has cost manufacturers significant sales because the manufacturer's software (while correct) has not been approved by and fees paid to ACCA.

Contractors: Beware of Inappropriate Load Calculation Software

For Immediate Release:
September 6, 2011
Contact: Melissa.Broadus@acca.org
703-824-8842

Manual J ® is the ANSI-approved national standard for determining residential load calculations for HVACR systems, and is required by many building codes and regulations. It is produced by the Air Conditioning Contractors of America (ACCA), the nation's largest association of indoor environmental systems professionals.

Given the complexities of modern construction, contractors and design professionals are encouraged to use software for accurate system design. However, not all load calculation software is created equal.

ACCA is reminding contractors that only those software programs that have been approved and licensed by ACCA as "Powered by Manual J ®" can be considered in compliance with codes and regulations requiring the use of Manual J ®.

As of today, the only software programs that meet the requirements for Manual J ® load calculations are:

- **RHVAC Residential Load Calculation from Elite Software**
- **Right – J from Wrightsoft**
- **AccuLoads from ADTEK Software Company**
- **Florida Solar Energy Center's EnergyGauge**

Any other software program, online service or mobile application cannot be considered to be compliant with the Manual J ® standard and should not be used where Manual J ® is required. Use of non-authorized software may pose a liability for the contractor that installs the system.

For more information on Manual J ®, the ACCA system design process, and load calculation software, visit https://www.acca.org/industry/system-design.

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

R403.6-EC-DEBES.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee believes that the ACCA Standards continue to be accepted and useful references for equipment sizing. The references do not preclude the code user from using other software.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County, representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.6 (N1103.6) Equipment Sizing (Mandatory). Heating and cooling equipment shall be sized in accordance with ACCA Manual S <u>or other approved sizing methodologies</u> <u>based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.</u> ~~standard engineering heat loss and heat gain formulas coupled with appropriate weather data, home construction materials and other considerations normally used in the HVAC industry.~~

Commenter's Reason: The current language permits ONLY the use of ACCA Manual S to size residential heating and cooling equipment. There are other sizing methodologies, such as ASHRAE's Handbook series, that are quite acceptable and approvable for use in sizing residential HVAC equipment.

RE143-13

Final Action: AS AM AMPC____ D

RE144-13
R403.6 (IRC N1103.6)

Proposed Change as Submitted

Proponent: Richard Grace, Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Revise as follows:

R403.6 (N1103.6) Equipment and appliance Sizing (Mandatory). Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

Exception: Heating and cooling equipment and appliances shall not be limited to the capacities determined in accordance with Manual S where any of the following conditions apply:

1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with Manual J fall within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with Manual J and the manufacturer's next larger standard size unit is specified.
3. The specified equipment or appliance is the smallest capacity unit available from the specified manufacturer.

Reason:

Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Item 3 - The current code language does not have provisions for sizing appliances for minimal dwelling unit or dwelling addition loads, other than forcing owners and contractors to change appliances to less desirable systems. For example; a 2 story townhouse, in climate zone 4, with 600 square feet per floor wants to utilize a two-zone system, or a separate heat pump system for each floor. A 1.5 ton unit per floor would exceed the requirements of Manual S, however a 1.5 ton unit could be the smallest available appliance made by the desired manufacturer. Current language would require a complete design change, such as utilizing a single appliance to serve the entire dwelling rather than the more desirable two-zone system, or requiring a system that utilizes electric baseboard heating and window-mounted air conditioning units. This is absurd, and an unfair to an owner that desires to reduce energy costs.

Cost Impact: None

R403.6-EC-GRACE.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval. The proponent intends to submit public comments to ACCA Manual S, rather than pursue code change in the IECC. The request for disapproval would allow the proponent to pursue this later in the public comment phase if need be.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Richard Grace, Fairfax County, representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.6 (N1103.6) Equipment and appliance Sizing (Mandatory). Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S <u>or other approved sizing methodologies</u> based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

> **Exception:** Heating and cooling equipment and appliance~~s~~ <u>sizing</u> shall not be limited to the capacities determined in accordance with Manual S <u>or other approved sizing methodologies</u> where any of the following conditions apply:
>
> 1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with ~~Manual J~~ <u>the approved heating and cooling methodology</u> fall within the range of the manufacturer's published capacities for that equipment or appliance.
> 2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with ~~Manual J~~ <u>the approved heating and cooling methodology</u> and the ~~manufacturer's~~ next larger standard size unit is specified.
> 3. ~~The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.~~

Commenter's Reason: After listening to the discussions presented during the Committee Action Hearings, we have incorporated those concerns within this modification. The first being the addition of "other approved sizing methodologies". ACCA's Manual S is not the ***only*** approved, appropriate sizing methodology available to size residential HVAC equipment. The current language would not permit other sizing methodologies such as ASHRAE's Handbook series. The second modification was to reword the language to provide clarity to the text. The third modification was to remove the third exception based on concerns voiced during testimony about the broad aspects that such an exception would permit.

The following is from the original reason statement:

Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Public Comment 2:

Luis Romeo Escobar, Air Conditioning Contractors of America requests Disapproval.

Commenter's Reason: The proposed exceptions to ACCA Manual S should be disapproved for the following reasons:

1. Variable refrigerant flow (VRF) technology is addressed in the revised Manual S. The committee that led the revision effort included representatives of VRF manufacturers. The new Manual S over size limits have been vetted by these committee members and is based on the available OEM expanded performance data. ACCA is following ICC procedures to ensure that the updated Manual S is the one referenced in the 2015 IRC and IECC.
2. Exceptions #2 and #3 are not based on sound technical grounds, but instead are contrived to benefit sales of a particular product class. This is specifically against the entire intent of Manual S and exactly what the industry needs to get away from.
3. The cost impact of this proposed change is not "none" as indicated by the proponents. Larger-than-necessary equipment will generally have higher initial costs (longer pay-back), higher energy costs due to constant cycling on-and-off of the equipment, shortened equipment lifespan (again, due to the wear-and-tear of constant cycling), and will have higher

maintenance costs if the proponents' example of two oversized units for one house is the case (homeowners are generally charged based on the number of units being serviced).

4. In the reasoning for item 3 the proponents state that a homeowner will see reduced energy costs by installing two oversized units as opposed to one properly sized unit – this patently absurd and unsubstantiated. The proponents, unfortunately not unlike many design practitioners, seem to think that installing two units is the only way to properly zone a home, which is not the case.
5. The main reason why the industry has a standard to avoid oversizing is in order to ensure that there is proper humidity control in the home. Severely oversized equipment does not stay on long enough for the coil to reach a low enough temperature for adequate moisture removal. This can result in the presence of mold and mildew, not to mention lead to an uncomfortable interior ambience (the dry-bulb temperature will be low, but the humidity high so it will feel clammy to the occupant). Clearly, this proposal would in no way makes a home safer, but instead puts the occupants in greater risk of developing serious health issues from the presence of moisture.
6. Manual S is not a suggestion, as the proponents erroneously purport. It is an industry developed, ANSI recognized standard that sets clear oversize limits that must be adhered to. While the old Manual S did have permissive language that may not have been adequately addressed by the directions on the inside cover, great care has been taken to ensure that the normative sections of the new Manual S are written in mandatory, enforceable language that is acceptable for the i-codes. It will undergo a second ANSI public review, during which anyone (proponents included) may submit a comment to correct any deficiencies.
7. Any exceptions to Manual S should be based on industry research, and not on personal anecdote. To date, no credible research has been produced that supports the claim that hugely oversized HVAC equipment is desirable or leads to a safer, more sustainable, more affordable, or more resilient home.
8. For situations in which the OEM expanded performance data is not available, the new Manual S provides a path for compliance in which the manufacturer certifies that the equipment meets the home's physical requirements.
9. Manual S already has procedures that allow for regional differences (the comparison of heating degree days to cooling degree days for qualification of different heat pump sizing limits).
10. One common problem that is used as justification for gross oversizing is that the specified OEM doesn't offer equipment with small enough capacity for the load requirements. Unfortunately, this will continue to be that case as long as the Manual S requirements are not enforced. This proposal is effectively asks code officials to compensate for a lack of OEM product offerings, which is not the purpose of the building codes (in fact, it will serve as a catch 22 that will prolong the same problem).

RE144-13

Final Action: AS AM AMPC____ D

RE145-13
R403.9.3 (NEW) (IRC N1103.9.3.1 (NEW))

Proposed Change as Submitted

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self (eosann@nrdc.org)

Add new text as follows:

R403.9.3.1 (N1103.9.3.1) Mechanical retraction mechanism. Vapor retardant pool covers having a dry weight of 40 lbs (18.1 kg) or more for heated pools associated with one- or two-family homes shall be provided with a mechanical retraction mechanism. The mechanism shall be designed for the cover material, the cover weight and the dimensions of the cover.

Reason: Pool covers serve to retain heat in heated pool systems and reduce water loss due to evaporation – but only when used. Swimming pools at single-family residences are frequently not professionally managed or maintained, and such pools are most likely to go for several consecutive days without use. These characteristics support the use and value of a pool cover. However, the frequent deployment and retraction of a large pool cover by an individual swimmer in a single-family setting is problematic, contributing to widespread disuse of this valuable energy- and water-saving feature.

This proposal would require a pool cover to come with a means for mechanical retraction if it weighs 40 pounds or more. While the most common type of floating cover material is relatively light (0.1 lb per ft^2), the weight of a cover for a moderately sized back yard pool (18' X 36') can surpass 60 lbs. and be unwieldy for an individual to handle. The proposal is not specific as to the means or design of the device for mechanical retraction, and does *not* require a permanently affixed automatic retraction system. A hand operated device of suitable size would meet the requirements of this proposal.

Cost Impact: Hand operated mechanical equipment for the retraction of pool covers are marketed at around $200, and are available from several manufacturers. At least 5 manufacturers provide automatic pool cover equipment.

R403.9.3.1 (NEW)-EC-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposed requirement is not an energy code issue.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.9.3.1 Mechanical retraction mechanism required. Vapor retardant pool covers having a dry weight of 40 lbs (18.1 kg) or more for heated in-ground pools associated with one- or two-family homes shall be provided with a mechanical retraction mechanism. The mechanism shall be designed for the cover material, the cover weight and the dimensions of the cover.

Reason: The committee raised concern over the suitability and availability of retraction equipment for above-ground pools. In response, the modification in this comment would limit the requirement to covers provided for in-ground pools.

RE145-13
Final Action: AS AM AMPC____ D

RE146-13
R403.10 (New) (IRC N1103.10 (New))

Proposed Change as Submitted

Proponent: Steve Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org(

Add new text as follows:

R403.10 (N1103.10) Fireplace systems (Mandatory). Fuel gas fired fireplace systems shall not have continuously burning pilot lights.

Reason: This language is consistent with the language on continuously burning pilot lights for pool heaters and gas lighting systems in the IECC. As of April 2012, under a 2009 US Department of Energy rulemaking, residential gas cooking equipment is not allowed to have continuously burning pilot lights.

According to the Hearth, Patio, and Barbecue Association, between 573,000 and 1,017,000 gas fireplace / hearth systems were shipped to North America every year between 2008 and 2011 (about 67 to 70% of total hearth shipments. See http://www.hpba.org/index.php?id=238 for more details). Many of these units are shipped to new homes with continuously burning pilot lights, ranging from 800 to 1,200 Btu's per hour. For a fireplace that has a pilot light using 1,000 Btu/hr, and is in "standby" mode for about 8000 hours per year (assuming that the fireplace is used 5 hours per day for 150 days of the year), the pilot light uses 8 million Btu's, or 80 therms. At a national average cost of $1.06 per therm, the cost to a typical consumer is nearly $85 per year.

With propane systems, 8 million Btu's is equivalent to 87.59 gallons. At a national average cost of $2.56 per gallon (*Federal Register* page 24940 April 26, 2012, Representative Average Unit Costs of Energy), the cost to a propane consumer is slightly more than $224 per year.

As a reference point, according to the 2010 AGA *Gas Facts 2008*, a typical gas range uses about 52 therms (5.1 Mcf) per year, and a typical clothes dryer uses about 50 therms (49 Mcf) per year (Table 10-1, page 78). In fact, according to the AGA publication, in the Pacific region of the US, residential natural gas fireplaces use more energy (28.3 Mcf) than a typical residential natural gas water heater (22.1 Mcf) and gas range (5.1 Mcf) combined.

Significant energy savings are available with current technology. With advanced controls (electronic spark ignition, for example), the standby energy losses are eliminated, and the average US consumer saves nearly $85 to $224 per year, based on the examples shown.

Cost Impact: The code change proposal will not increase the cost of construction. Electronic ignitions are widely available.

R403.10-EC-ROSENSTOCK.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Continuously burning pilot lights use a significant amount of energy. Disallowing them will represent energy savings. This action is consistent with previous year's actions on gas pilot lights for pool heaters and gas lighting systems.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and because public comments were submitted.

Public Comment 1:

Don Denton, representing Don Denton, Consulting Engineer requests Disapproval.

Commenter's Reason: Proposed code change RE146-13 should be disapproved, because unvented gas heating products would be eliminated by its adoption. It is improper for three key reasons:

First, **a code change should not eliminate a safety requirement of an ANSI national product standard and the United States Consumer Product Safety Commission (CPSC).** The ANSI national product standard requires unvented gas heating products to have a precisely made standing pilot as a safety device to shut-off the unit in case of oxygen reduction in the room air. It has been mandated by the CPSC for the past 34 years.

Second, **no code change related to energy conservation should eliminate the most energy efficient gas appliance that exists**. Besides, the standing pilot's energy isn't wasted, as it adds needed heat to the room.

Third, **consumers should not be denied the choice to buy unvented gas heating products.** The proponent's claim that the code change would not increase the cost of construction is wrong. Unvented gas heating products provide not only energy savings, but acquisition and installation savings as well.

Public Comment 2:

Mark Krebs, Laclede Gas Co., representing self requests Disapproval.

Commenter's Reason: Fuel gas-fired fireplaces are short-term use decorative hearth products that serve a unique, value-added function for the users. Unlike pool heaters, fireplaces are not unattended, automatically controlled appliances. Unlike continuously operating gas lights, fireplaces do not operate throughout the year, nor do they operate unattended overnight. One of the unique, value-added functions of a fuel gas fired fireplace systems is the pilot light ignition function. It is a reliable approach that can be used without electricity service.

Consumers making the choice of purchasing a fireplace with pilot light ignition understand the value added and limited operating cost impact of this unique feature. Since the pilot light can be manually shut off and re-opened repeatedly by the user, it is a uniquely useful function that can be included with the product at minimum annual energy cost. Such useful and unique features should not be prohibited in a minimum energy code.

Public Comment 3:

Patrick A. McLaughlin, McLaughlin & Associates, representing The Air-Conditioning, Heating and Refrigeration Institute, requests Disapproval.

Commenter's Reason: The Air-Conditioning, Heating and Refrigeration Institute request disapproval of RE146. Requiring that fireplace systems not have a continuously burning pilot light will violate NAECA for some appliances and the pilot light is a component of the oxygen depletion safety system in others. These safety and preemption issues override the minor energy efficiency gains.

Public Comment 4:

James Ranfone, American Gas Association, representing self, requests Disapproval.

Commenter's Reason: This comment is in support of the floor action taken during the hearings to disapprove the proposal. The proposal proponent provided misleading information to justify a ban of widely available consumer product. The proponent stated that "*according to the Hearth, Patio, and Barbecue Association that between 573,000 and 1,017,000 gas fireplace / hearth systems were shipped to North America every year between 2008 and 2011 (about 67 to 70% of total hearth shipments. See http://www.hpba.org/index.php?id=238 for more details)*." They failed to note that a significant portion of those shipments are classified as heaters (both vented and unvented) and therefore subject to federal efficiency regulations. The ban would violate federal preemption of these products. It would also ban unvented fireplace heaters that have a standing pilot to operate the oxygen depletion system (ODS).

Based on misleading shipments they calculated a significant energy/cost savings to the consumer. They failed to note that many homeowners extinguish the pilot lights on decorative appliances for a significant portion of the year. At a minimum the proponent should have reduced their stated savings to account for a certain percentage of such homeowners. Therefore, the proponent overstated potential energy and cost savings to the consumer.

In addition, the proponent falsely claimed the code change would not increase the cost of construction. A non-pilot light appliance would most likely be a more expensive appliance and some would require adding electrical service to the gas-fired fireplace, both of which would result in an increase in construction costs.

The intent of EEI's initiative to seek a code ban based on energy savings is questionable, since the likely appliance substitute would be electric decorative fireplaces and electric resistance- type room heater. Such electric appliances would potentially use more energy and be more costly for the consumer to operate. In section R405.3 of the IRC, the performance-based compliance path has a 3.16 energy source multiplier factor for electric and a 1.1 factor for natural gas. The U.S. DOE 2013 representative unit residential cost figures are $35.46 per million Btu for electricity and $10.87 per million Btu for natural gas, substantiating the 3.16 multiplier.

For all these reasons AGA supports disapproval of this proposal.

Public Comment 5:

Thomas Stroud, Hearth, Patio and Barbecue Association, representing self, requests Disapproval.

Commenter's Reason:

1. Energy savings claims are not supportable. Energy savings claims presented are not supportable. We can walk you through the calculations, but even using a "worst case" evaluation, energy loss is less than the equivalent of a 100W light bulb per unit, and in a "most likely" set of parameters, the energy loss is less than the equivalent of a 50W light bulb. Weighing all factors and risks, it is clear that the potential savings, if there are indeed any, is not justified or even prudent.

    a. Vent free products - all of the pilot heat goes to the conditioned space and therefore, effectively contributes to heating the conditioned space thus, reducing the amount of primary heat required, so there is NO net loss of energy.
    b. Direct vent products - fireplace efficiencies are approximately 65%, so conservatively, 60% of the pilot heat goes to the conditioned space in those applications, leaving 40% as a "loss."
    c. B-vent products - some of the heat would go to the conditioned space, but for this discussion, we'll consider it all lost.
    d. ALL products pilot heat cannot be considered "lost" while the main burner is on, so we can deduct run time from the equation, as well as time when the pilot is turned off.
    e. Even if vent free is only 10% of the installed population of concern, another 15% is B-vent and the remaining 75% is direct vent, a direct calculation using 1,000Btu/h as a normalized typical pilot rate tells us the energy "loss" is:
        i. 100% of 15% B-vents, or 0.15*1000=150Btu/h
        ii. 0% of 10% vent-free units, or 0*1000=0Btu/h
        iii. 40% of 75% direct vent units, or 0.3*1000=300Btu/h
        iv. Which totals a loss usage of 150+0+300Btu/h = **450Btu/h** for every unit that has a continuous pilot on a normalized "typical" basis.
    f. Additionally:

        a. We can safely assume the units will be operated a total of 10 "burn days" per year as an average, so 10/365=0.027, or 2.7%.
        b. Subtracting 2.7% from 450Btu/h leaves us with 0.973*450Btu/h=**438Btu/h**, which applies to EVERY normalized "typical" unit with a continuous pilot.
        c. If we assume conservatively, that 50% of people turn their pilots off during the "off-season", and we agree the "off-season" is 50% of the year, then we can say that 0.5*0.5=25% of the year, a normalized "typical" pilot is turned off.
        d. 25% of 450Btu/h for the normalized "typical" unit is 0.25*450Btu/h=**113Btu/h.**
    g. So the final loss usage for the normalized "typical" continuous pilot is 438Btu/h-113Btu/h=***325Btu/h***. At 3.412Btu/Wh, this translates to a continuous burning 325/3.412=95W light bulb.
    h. And this does not even consider the energy "loss" from whatever other ignition means will be used in place of the continuous pilot!
2. Recognition of Products
    a. It is essential that if the ban on continuously burning pilot lights goes forward, there must be a definition of "continuously burning pilot". The importance of this is so that it is clear what types of pilots are allowed. The definition in ANSI Z21.20 is;
        i. Continuous. An ignition source which, once placed in operation, is intended to remain ignited or energized continuously until manually interrupted.
    b. It is likewise essential that there is a clear understanding among the code inspection community of what is and is not allowed. As you know, there are flame-type pilots that are not "continuous", which would be acceptable.
    c. Proven pilot systems are the primary type among hearth products, vs. the systems that directly sense main flame employed in the other products we've heard about (pool heaters and gas lights).
3. Elimination of products built to ANSI safety standards
    a. The ban on continuously burning pilot lights will eliminate products from the marketplace that have no loss at all from their continuously burning pilot. As noted above, since the unvented gas products do not vent to the exterior, all heat derived from the pilot stays within the dwelling.
4. Safety
    a. Many manufacturers stand behind their claims that, particularly in cold climates, their products will function better with a standing pilot. As well as the fact that any loss of energy from the pilot might likewise be a loss when cold air enters a non-piloted system and the resulting cold glass surface of the glass fireplace front requires additional heat from the dwelling. There has been no research to prove or disprove this claim.

Nonetheless they stand behind many years of functioning well with a continuously burning pilot and stand behind their claims that their users largely follow their use instructions to turn the pilots off in the summer months.

   b. Finally, as you are aware, there have been safety concerns raised related to different types of ignition systems. Regardless of your position related to what those are, I think you'd agree that these types of products must be as safe as we can make them; that your consideration must be at the system level, and must include consideration of application and environments where differences in parameters and combinations of conditions can bring about different responses in these products. So, if you consider that certain types of systems occur more frequently in certain climates and locations, and if you realize it's that way because decision makers with optimum safety being in their best interest drove them to it, then eliminating one of their options drives them to something else; some OTHER system than what they know to be successful and safe. Would such a change cause problems that can be directly assigned to having eliminated an option that has performed so flawlessly for so long?

5. Finally, the statement that there would be no increase in construction cost is incorrect. Most products operating on standing pilots currently will need to go through a Research & Development stage to switch piloting systems, as well as the fact that many of the non-standing pilot units will now have to have power run to them, adding to the cost.

Public Comment 6:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Disapproval.

Commenter's Reason: The banishment of standing pilot lights in fuel gas fireplace systems would have a negative effect on the safety of the general public for the following reasons:

1. The oxygen depletion system (ODS) is a safety device that is used to monitor the oxygen level in a room or space where an unvented fireplace system is installed. The ODS has an exemplary safety record of being used in 22 million units over the past 32 years. The ODS shuts the appliance off automatically if the oxygen level in the room drops to a level of 18%, which correlates with the amount of carbon monoxide in the space. The ODS requires a standing pilot light to function and therefore the acceptance of RE146-13 would prohibit the use of this important safety device.
2. Invariably, winter in the United States brings with it power outages and significant hardships, due to ice and snow damaging power lines. Often times people are left with no alternatives to heat their families and their homes and they turn to burning fuels indoors in appliances that are not listed or safe to use inside of buildings. It is very important that appliances that have been tested and listed for use indoors and that can function safely during power outages continue to be permitted by the code. Many of these appliances, including the fireplaces that RE146-13 is addressing, are ignited by standing pilot lights.
3.

We request the ICC membership to disapprove RE146-13.

RE150-13
R202 (NEW) (IRC N1101.9 (NEW)), R404.1 (IRC N1104.1)

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). ~~A minimum of seventy-five percent of the~~ Lamps in permanently installed lighting fixtures shall be high efficacy lamps ~~or a minimum of seventy-five percent of the permanently installed lighting fixtures shall contain only high efficacy lamps~~.

Exceptions:

1. Lamps in low-voltage lighting.
2. Lamps controlled by a dimmer or an *automatic control device*.
3. Lamps of 10 watts or less.
4. Lamps contained in appliances

Add new definition as follows:

AUTOMATIC CONTROL DEVICE. A device or system capable of automatically turning lighting loads off without manual intervention. Automatic control devices often include a feature for turning lights on manually.

Reason: Builder installed lighting represents roughly 7% of residential electricity use. This proposal has the potential to reduce household energy use by over 1%.
By requiring lamps (rather than fixtures) to be high efficacy, leaves open the ability for innovative new lighting technologies which can be used in a standard lighting base.
Durability of fixture ballasts is also a concern. Ballast repairs are not generally done by a consumer and will typically require an electrician replace the fixture at a significant cost increase to the consumer.
The new language is simpler, more enforceable and more stringent. It makes the code require 100% high efficacy lighting with an allowance for standard efficacy when special lighting controls are used.
Exceptions still maintain the stringency, but provide reasonable allowances for small lighting loads.

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

R404.1-EC-SURRENA.DOC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

AUTOMATIC CONTROL DEVICE. A device or system capable of automatically turning ~~lighting~~ loads off without manual intervention. The device or system may include a manual feature but is not required. ~~Automatic control devices often include a feature for turning lights on manually.~~

Committee Reason: The proposal provides needed flexibility in the code for meeting energy efficiency goals. The modification is made to recognize that an automatic control device could apply to equipment other than lighting.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Deborah Frankhouser, Four Point Lighting Design, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). Lamps in permanently installed lighting fixtures shall be high efficacy lamps.

Exceptions:

1. Lamps in low-voltage lighting.
2. ~~Lamps~~ Not more than 50% of lamps in permanently installed fixtures shall be allowed to be non-high efficacy where such fixtures are controlled by a dimmer switch or automatic control device.
3. Lamps of 10 watts or less.
4. Lamps contained in appliances.

(*Portions of proposal not shown remain unchanged.)*

Commenter's Reason: The proposal as approved by the committee, would allow 100% of lighting to be low efficacy if it was on a dimmer of automatic control device; from an energy efficiency standpoint, this is a step backwards.

The modification above strikes a good balance between those who want the flexibility of using some preferred low efficacy sources (using dimming or automatic shutoff to increase energy efficiency), while maintaining current industry energy efficiency expectations. This modification also maintains the simplicity of the proposal. Exception 2 is optional- for those who do not want to count lamps, they can meet the high efficacy requirement without doing any percentage calculation; only those who want to use exception number 2 would be required to demonstrate that the low efficacy lamps did not exceed 50% of the total lamps.

Public Comment 2:

Hope Medina, City of Cherry Hills Village, CO, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). A minimum of seventy-five percent of the Lamps in permanently installed lighting fixtures shall be high efficacy lamps or a minimum of seventy-five percent of the permanently installed lighting fixtures shall contain only high efficacy lamps.

Exceptions:

1. Lamps in low-voltage lighting.
~~2. Lamps controlled by a dimmer or a~~An *automatic control device*.
~~3.~~2 Lamps of 10 watts or less.
4.3 Lamps contained in appliances

(*Portions of proposal not shown remain unchanged.)*

Commenter's Reason: I am in favor of what the proponent is attempting to do with the code change, but I feel that dimmer switches will be used as a loophole to the code requirement. Using a dimmer switch as an exception to the requirement may increase the use of incandescent bulbs.

I have reviewed plans and inspected homes where an excessive amount of permanent fixtures are wired to a dimmer switch in every room. This change would have increased energy usage in these homes that are from both track builders and custom home builders.

Public Comment 3:

Donald Vigneau, AIA, representing Northeast Energy Efficiency Partnerships Inc., requests Disapproval.

Commenter's Reason: The proposed definition for *automatic control device* is flawed; would apply to loads other than electrical lighting; and would allow systems with no manual switch control to turn lighting on or off without any means for intervention. This was not corrected by the modification language approved.

The added Exception would allow for any and all non-efficient bulbs using these automatic controls without limitation and eliminate any claimed savings in increasing the percentage of high-efficiency lamps.

The change would not decrease the work level of code officials in determining compliance, as every switching arrangement would have to be inspected to determine if it met these provisions and could not be overridden or defeated. There is no difficulty (as suggested in the original reason statement) of obtaining high-efficiency lamps that are able to utilize standard Edison bases, whether CFL or LED. The ability to circumvent the 75 percent high-efficiency lamp/fixture standard with the use of dimmers, many of which that would actually increase the connected load, reduces the lighting efficiency below what is currently required in the existing code.

The proposal is flawed and should be disapproved.

RE150-13

Final Action: AS AM AMPC____ D

RE153-13
R405.2 (IRC N1105.2)

<u>Proposed Change as Submitted</u>

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R405.2 (N1105.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. ~~All supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.~~

Reason: Duct insulation is labeled both "prescriptive" in Section R403.2.1 and "mandatory" in R405.2. It can't be both.

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

R405.2-EC-CONNER.DOC

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The proponent did not supply any technical justification for this lessening of requirements.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Craig Conner, Building Quality, representing self, requests Approval as Submitted.

Commenter's Reason: The committee thought this was a reduction in requirements; however the struck sentence has lower requirements than the retained sentence. The confusion is clear, but the proposed resolution does not seem to be a reduction in requirements.

The retained section is:
"R403.2.1 Insulation (Prescriptive). Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6."

The struck sentence is:
"All supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6."

Public Comment 2:

Jay Crandell, P.E., representing the Foam Sheathing Committee of the American Chemistry Council requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.2 (N1105.2) Mandatory requirements <u>and other limitations</u>. Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. All supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6<u>. U-factors for opaque building thermal envelop components included in Table R402.1.3 shall not be increased by more than 15 percent in the proposed design on an area-weighted average basis for each component.</u>

Commenter's Reason: While the committee noted that there was no technical justification given for deleting a technical requirement, the proposal makes an important point: The duct insulation requirement is not a mandatory requirement in the context of Chapter 4. But, in the context of Section R405.2, it is a limitation on the performance path. Basically, the code is saying that one cannot simply have an entirely "energy neutral" approach to the performance path because this can have negative impacts on the performance of certain systems and potential unintended consequences. Therefore, this public comment recognizes that Section R405.2 is actually addressing both mandatory requirements and other limitations that apply to the performance path. The title of the section is changed accordingly to clarify its purpose and the limit regarding ductwork is maintained as in the existing code (first underlined sentence).

In addition, this proposal in effect is dealing with the appropriateness of having limitations on the performance path that are not otherwise captured in mandatory statements. It is also clear from the committee's reason for disapproval that such limitations (or the absence thereof) should have a technical rationale. Thus, it is appropriate to consider limitations as this is the fundamental subject of the proposal.

Ductwork is actually part of the building envelop per se when in unconditioned spaces. Conditioned air from the interior of the building is subject to heat loss when being transported through ducts just as heat loss occurs through ceilings, walls, and other building envelope assemblies or components. When using the performance path on a purely "energy neutral" basis without limitation or discretion, unintended consequences can occur that are not adequately prevented by a purely "energy neutral" approach to performance (without technically sound limitations). Technically sound limitations bring to bear performance considerations that go beyond a view of just keeping the energy balance in an overall sense, but potentially harming performance in the details.

For the same reason it is important to limit the performance approach with respect to ducts in unconditioned space, it is also important to limit the performance approach in regard to its potential to degrade the performance of the building thermal envelope. Over-reaching reductions in building envelope thermal efficiency, like ductwork, can have unintended consequences. Some of these consequences that justify reasonable limitations on the performance path include:

1. An imbalance or over-reliance on one means of conserving energy which has a shorter service life, can result in a much less robust means of achieving energy efficiency. Therefore service life should be taken into consideration when establishing appropriate limitations on tradeoffs.
2. The potential for unlimited reductions in thermal envelope efficiency can result in poorer performance in ways that are not accounted for in the performance path. For example, when significantly reducing the building envelope insulation, interior surfaces are subject to larger temperature gradients dramatically affecting occupant comfort. This often results in changing of the set-point temperature further degrading the energy performance of the building. Also, in the case of power outages or equipment failure, it is more difficult to maintain tolerable living conditions.

Finally, it is important to recognize that other sections of the code also impose reasonable limitations on the performance path. For example, Section R402.5 imposes a limitation on the amount of increase in the overall U-factor for fenestration. Without such limits on the performance path, unintended consequences will occur that have other than "energy neutral" performance implications (e.g., excessive condensation on windows in colder climates and occupant discomfort leading to corrective actions such as increasing energy consumption by altering the set-point temperature). Such precedents for limitations on performance or simulation methods go beyond the energy code. For example, a 15% limit on reduction of wind loads is imposed on wind tunnel simulations unless worst-case scenarios are considered that demonstrate the reductions are "safe". Therefore, a similar approach is taken in this public comment to ensure a robust and balanced use of the performance path while avoiding the potential for "weak links" in the overall building system.

RE153-13

Final Action: AS AM AMPC____ D

RE154-13
R405.2 (IRC N1105.2), R405.2.1 (NEW) (IRC N1105.2.1 (NEW))

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic Inc., representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.2 (N1105.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of ~~R-6~~ R-8. Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, whichever is less.

R405.2.1 (N1105.2.1) In process inspection requirement. Inspections of the code-required energy specifications documented in the simulated performance code-compliance reports shall be verified to demonstrate that the as-built conditions meet or exceed the specified parameters used for the code-compliance reports. The entity or persons who performed the analysis shall perform the inspections or where *approved*, other *approved* entities or persons shall perform the inspection.

Reason: Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building, a plan is often mastered and that one plan may be built over 100 times. To ensure that each house meets the performance analysis, each home must be inspected.
2. Computer generated energy analyses utilize worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actually built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the homes plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is addressed and site specific which ultimately ensures that the home that received its permit from the proposed design's energy analysis has carried out what they have proposed, which is to meet the intent of the code, even if each component of the home is not exactly the same as what was on the set of plans.

Cost Impact: On a national basis there could be a cost impact as most jurisdiction's would allow third party inspections and not do the energy analysis themselves. However, this is one of many code compliance pathways the builder may choose and it is important that the builder realize that when this option is chosen that they in essence are locking themselves into a code compliance path that requires energy analysis and inspection. In Colorado, many builders utilize this path and are seeing value due to increased quality assurance, consistency across jurisdictional boundaries in a home rule state, and measured quantification of compliance.

R405.2-EC-SCHWARZ.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Items of this detail do not belong in the performance side of the code. This seems to be a shotgun approach to dealing with insulation ductwork on the performance side.

Assembly Action: None

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic Inc., representing EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.2 (N1105.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of ~~R-6~~ <u>R-8.</u> ~~Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, whichever is less.~~

R405.2.1 (N1105.2.1) In process inspection requirement.
Inspections of the code-required energy specifications documented in the simulated performance code-compliance reports shall be <u>field</u> verified <u>and documented.</u> ~~to demonstrate that the as-built conditions meet or exceed the specified parameters used for the code-compliance reports. The entity or persons who performed the analysis shall~~ <u>be permitted to</u> ~~perform the inspections or where *approved*, other *approved* entities or persons shall perform the inspection.~~ <u>Inspections shall be performed by the code official or approved third party.</u>

Commenter's Reason: I agree with the committee that I was trying to do too much with this code change. I therefore pared down the proposal to its most important aspect mandatory inspection.

Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building, a plan is often mastered and that one plan may be built repeatedly from the master. To ensure that each house meets the performance analysis, each home must be inspected.
2. Computer generated energy analyses utilize worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actual built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the home's plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is accurate and site specific. Ultimately a home that received its permit from a proposed design's energy analysis must be inspected to meet the intent of the code, as component's of the home may not be exactly the same as what was on the set of plans.

RE154-13

Final Action: AS AM AMPC____ D

RE157-13
R405.2 (IRC N1105.2), R405.2.1 (NEW) (IRC N1105.2.1 (NEW))

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic Inc., representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.2 (N1105.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of ~~R-6~~ R-8. Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, whichever is less.

R405.2.1 (N1105.2.1) In process inspection requirement. Inspections of the code-required energy specifications documented in the simulated performance code-compliance reports shall be verified to demonstrate that the as-built conditions meet or exceed the specified parameters used for the code-compliance reports. The entity or persons who performed the analysis shall perform the inspections or where *approved*, other *approved* entities or persons shall perform the inspection.

Reason: Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building, a plan is often mastered and that one plan may be built over 100 times. To ensure that each house meets the performance analysis, each home must be inspected.
2. Computer generated energy analyses utilize worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actually built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the homes plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is addressed and site specific which ultimately ensures that the home that received its permit from the proposed design's energy analysis has carried out what they have proposed, which is to meet the intent of the code, even if each component of the home is not exactly the same as what was on the set of plans.

Cost Impact: On a national basis there could be a cost impact as most jurisdiction's would allow third party inspections and not do the energy analysis themselves. However, this is one of many code compliance pathways the builder may choose and it is important that the builder realize that when this option is chosen that they in essence are locking themselves into a code compliance path that requires energy analysis and inspection. In Colorado, many builders utilize this path and are seeing value due to increased quality assurance, consistency across jurisdictional boundaries in a home rule state, and measured quantification of compliance.

R405.2-EC-SCHWARZ.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This approach is an attempt to install a level of complexity to the code that does not represent any real advantage. Rules are needed for the calculations, such as rules for dealing with components with an energy life less than 30 years.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an energy cost over ~~a 30 year useful~~ the life of the building, on a present value basis, that is less than or equal to the energy cost over ~~a 30 year useful~~ the life of the building, on a present value basis, of the *standard reference design*. Improvements in energy efficiency in the *proposed design* over the *standard reference design* shall be assumed to revert to the *standard reference design* at the end of the ~~useful~~ life of the improvement. Energy prices, energy price escalation rates, discount rates, the ~~useful~~ life of the building and specific building features and components including installed energy efficiency measures in the building and all other necessary assumptions for the analysis shall be taken from *approved* sources. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

Exception: The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: We recommend approval of RE157 as modified by this public comment. RE157 corrects one of the major weaknesses in the current simulated performance alternative: it alters the compliance calculation to be based on the life of the building and reflecting the life of installed measures, rather than just the first year of the building's operation. This means that measures which may only last a few years are not automatically equated in the performance path with those that last several decades (up to the full lifetime of the building). The current performance calculation is not an accurate assessment of the energy performance of the building beyond year one, and since residential buildings are expected to last 70 or 100 years (or longer), the performance calculation should reflect the energy use over that lifetime.

The reason statement for the original RE157 covers the many reasons why this change makes sense, so there is no need to repeat those statements here. The modifications above provide additional flexibility to the code official to determine the expected life of the building.

At the Code Action Hearing, some concern was raised about the sources from which the information on energy prices, escalation rates, component lifetimes, and other assumptions could be taken. Again, we have not listed specific standards to allow the authority having jurisdiction to determine and approve the most appropriate set of assumptions. From our experience, the necessary data are available publicly from sources like ASHRAE, US DOE and its national labs. Moreover, if this proposal is approved, we would expect DOE to create a REScheck version and documentation to reflect this new approach.

The simulated performance alternative should take into account the performance of the building over its life. This will add more clarity and accuracy to the calculation, and will provide more long-term energy savings for the eventual owners of the home.

RE157-13

Final Action: AS AM AMPC____ D

RE158-13
R405.3 (IRC N1105.3)

<u>Proposed Change as Submitted</u>

Proponent: Keith Dennis, P.E., National Rural Electric Cooperative Association (NRECA) representing NRECA. (Keith.Dennis@nreca.coop)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence *(proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use-pricing in energy cost calculations.

> **Exception:** The energy use based on <u>site or</u> source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be <u>1.89</u> ~~3.16~~. The source energy multiplier for fuels other than electricity shall be 1.1.

Reason: This revision provides more flexibility for code officials, and updates the energy source multiplier for electricity to a more current number developed by DOE for appliance energy efficiency standards for 2015 in recent rulemakings (for dishwashers and furnace fans) in Technical Support Documents. The current code includes an outdated factor and does not allow the ability to use site energy, which is the metric that can best be directly affected during construction. The inclusion of site energy would not be setting any precedents. Site energy was originally allowed in this exception and used by code officials. Unfortunately, it was removed in 2009. (See the following sources):

Furnace Fan Technical Support Document, June 2012:

http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/41

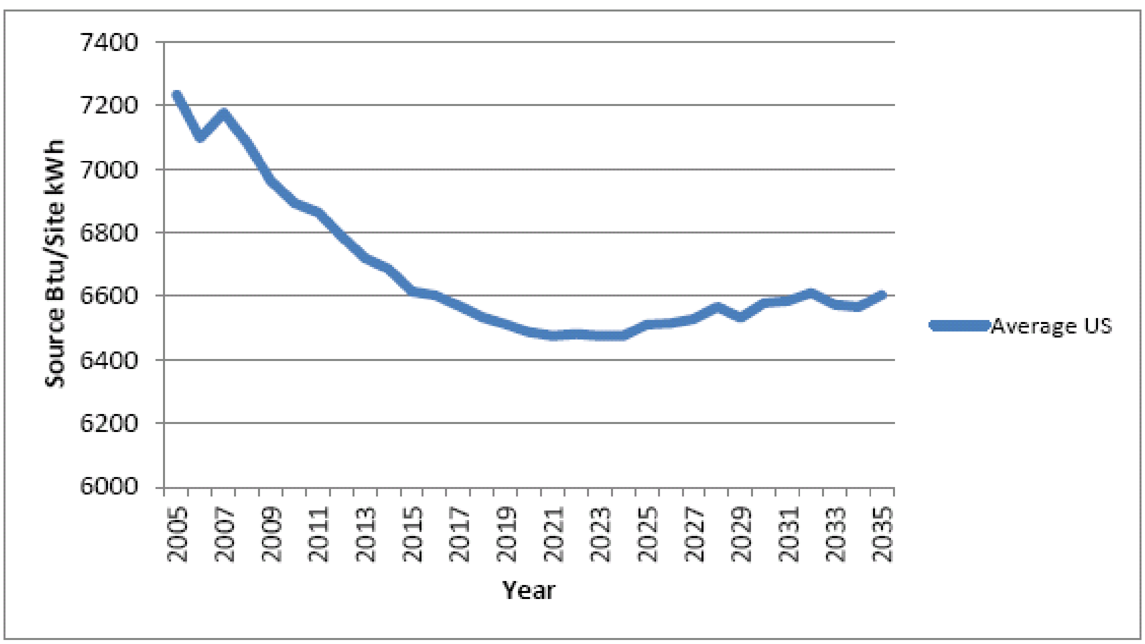


Figure 10.3.1 Site-to-Source Conversion Factors for Electricity

Dishwasher Technical Support Document, May 2012

http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/67

Table 10.3.3 Site-to-Source Conversion Factors for Electricity and Natural Gas

Year	Electricity Btu/kWh	Natural Gas Btu/Btu	Year	Electricity Btu/kWh	Natural Gas Btu/Btu
2010	7,009	1.07	2023	6,506	1.07
2011	6,827	1.07	2024	6,534	1.07
2012	6,651	1.07	2025	6,534	1.07
2013	6,549	1.07	2026	6,538	1.07
2014	6,486	1.07	2027	6,552	1.07
2015	6,448	1.07	2028	6,555	1.07
2016	6,443	1.07	2029	6,551	1.07
2017	6,433	1.07	2030	6,548	1.07
2018	6,427	1.07	2031	6552	1.07
2019	6,425	1.07	2032	6,551	1.07
2020	6,436	1.07	2033	6,548	1.07
2021	6,468	1.07	2034	6,550	1.07
2022	6,483	1.07	2035–2047	6,561	1.07

Source: NEMS, 2011.

Using the 2015 value, 6,448 Btu / 3,413 Btu/kWh = 1.889246997 = 1.89

Cost Impact: The code change proposal will not increase the cost of construction. There is no cost impact to updating the source energy multiplier for electricity and increasing flexibility.

R405.3-EC-DENNIS.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is a wide amount of data which can be consulted in determining information about source energy multipliers. The industry must agree upon a source for the determination of source multipliers. Meantime, the number that is presently in the code has some basis for justification.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Keith Dennis, National Rural Electric Cooperative Association (NRECA), requests Approval as Submitted.

Commenter's Reason: Site energy was part of the exception for many years until it was recently removed. There are many reasons to allow site energy to be used instead of energy costs:

1) Site energy is an actual metric that can be measured and verified by code officials, while source energy is an estimate.
2) Site energy information is credible, as it is shown on customers' energy bills on a monthly basis and used in other consensus-based code documents, such as ASHRAE 90.1, ASHRAE 90.2, and ICC-700 use site energy metrics for efficiency requirements.
3) DOE uses site energy information in many of its energy efficiency and energy consumption publications, such as the Residential Energy Consumption Survey. DOE uses site energy for its appliance energy efficiency standards program and the FTC uses site energy on the yellow EnergyGuide labels found on consumer appliances. EPA uses site energy to determine if an appliance or home qualifies for the Energy Star program.
4) Site energy is reliable, since it can be measured by utilities, consumers, and independent 3rd parties. In terms of energy efficiency upgrades, consumers rely on site energy information (amount used by older appliance or equipment compared to new appliance or equipment) to help them make energy efficiency decisions.
5) Site energy is replicable, as the units of measurement (kWh, therms, gallons, Btu's) can be used throughout the United States and are familiar to consumers on their monthly energy bills. Source energy is not replicable, as different estimates must be used for different energy sources, and different entities can make different assumptions about upstream production and delivery of different energy sources.
6) Site energy is transparent and easy to understand. It can be based on meter readings or DOE test procedures or FTC EnergyGuide labels or Energy Star labels. It is the metric that allows people to easily compare energy efficiency options in the marketplace. It is the metric that allows people to make good economic choices when faced with competitive alternatives.

This revision provides more flexibility for code officials, and updates the energy source multiplier for electricity to a more current number developed by DOE for appliance energy efficiency standards for 2015 in recent rulemakings (for dishwashers and furnace fans) in Technical Support Documents. The current code includes an outdated factor and does not allow the ability to use site energy, which is the metric that can best be directly affected during construction. The inclusion of site energy would not be setting any precedents. Site energy was originally allowed in this exception and used by code officials. Unfortunately, it was removed in 2009. (See the following sources):

Furnace Fan Technical Support Document, June 2012:
http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/41

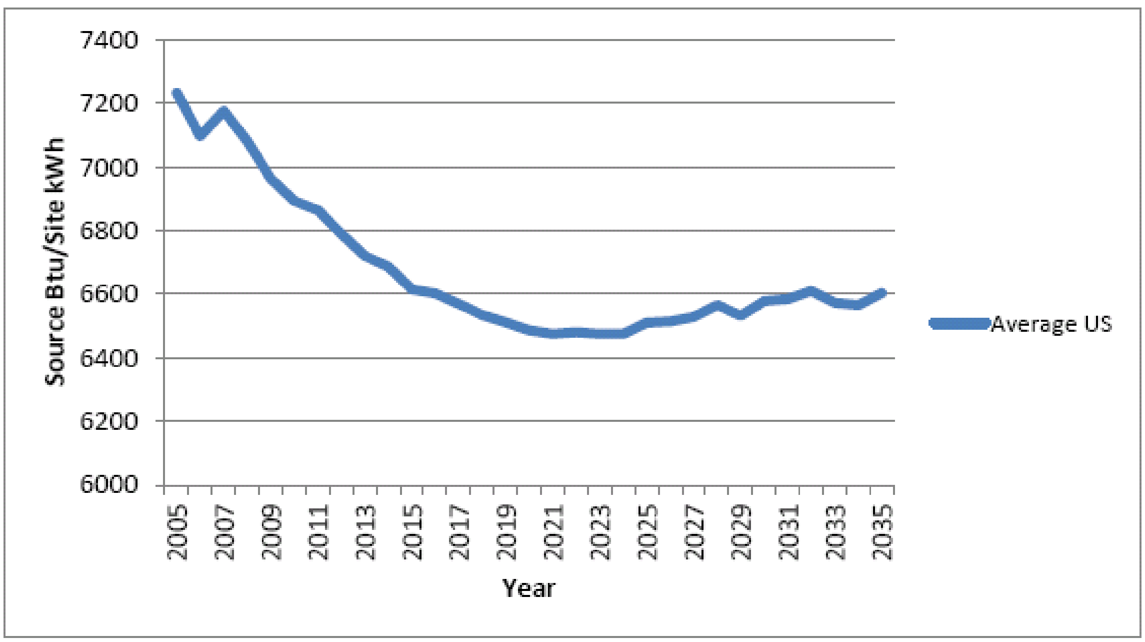


Figure 10.3.1 Site-to-Source Conversion Factors for Electricity

Dishwasher Technical Support Document, May 2012
http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/67

Table 10.3.3 Site-to-Source Conversion Factors for Electricity and Natural Gas

Year	Electricity Btu/kWh	Natural Gas Btu/Btu	Year	Electricity Btu/kWh	Natural Gas Btu/Btu
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2011	6,827	1.07	2024	6,534	1.07
2012	6,651	1.07	2025	6,534	1.07
2013	6,549	1.07	2026	6,538	1.07
2014	6,486	1.07	2027	6,552	1.07
2015	6,448	1.07	2028	6,555	1.07
2016	6,443	1.07	2029	6,551	1.07
2017	6,433	1.07	2030	6,548	1.07
2018	6,427	1.07	2031	6552	1.07
2019	6,425	1.07	2032	6,551	1.07
2020	6,436	1.07	2033	6,548	1.07
2021	6,468	1.07	2034	6,550	1.07
2022	6,483	1.07	2035–2047	6,561	1.07

Source: NEMS, 2011.

Using the 2015 value, 6,448 Btu / 3,413 Btu/kWh = 1.889246997 = 1.89

RE158-13

Final Action: AS AM AMPC____ D

RE160-13
R405.3 (IRC N1105.3)

Proposed Change as Submitted

Proponent: Steve Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence *(proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use-pricing in energy cost calculations.

> **Exception:** The energy use based on <u>site or</u> source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier<u>s shall be determined by the *code official*</u>. ~~for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1~~.

Reason: This proposal will make the provision more flexible for building designers, building owners, and code officials.

<u>Part I: Site Energy</u>

Site energy was part of the exception for many years until it was recently removed. There are many reasons to allow site energy to be used instead of energy costs:

1) Site energy is an actual metric that can be measured and verified by code officials, while source energy is an estimate.
2) Site energy information is credible, as it is shown on customers' energy bills on a monthly basis and used in other consensus-based code documents, such as ASHRAE 90.1, ASHRAE 90.2, and ICC-700 use site energy metrics for efficiency requirements.
3) DOE uses site energy information in many of its energy efficiency and energy consumption publications, such as the Residential Energy Consumption Survey. DOE uses site energy for its appliance energy efficiency standards program and the FTC uses site energy on the yellow EnergyGuide labels found on consumer appliances. EPA uses site energy to determine if an appliance or home qualifies for the Energy Star program.
4) Site energy is reliable, since it can be measured by utilities, consumers, and independent 3rd parties. In terms of energy efficiency upgrades, consumers rely on site energy information (amount used by older appliance or equipment compared to new appliance or equipment) to help them make energy efficiency decisions.
5) Site energy is replicable, as the units of measurement (kWh, therms, gallons, Btu's) can be used throughout the United States and are familiar to consumers on their monthly energy bills. Source energy is not replicable, as different estimates must be used for different energy sources, and different entities can make different assumptions about upstream production and delivery of different energy sources.
6) Site energy is transparent and easy to understand. It can be based on meter readings or DOE test procedures or FTC EnergyGuide labels or Energy Star labels. It is the metric that allows people to easily compare energy efficiency options in the marketplace. It is the metric that allows people to make good economic choices when faced with competitive alternatives.

<u>Part II – Revision of Source Energy Estimates</u>

There are many ways to estimate upstream energy losses. The energy production industry is very dynamic and subject to significant changes. In the United States in 2012 and 2013, there was and will be record amounts of natural gas produced from hydraulic fracturing production techniques. In 2012 and 2013, there will be record amounts of oil produced and imported from oil sands production. In 2012, there was a record amount of electricity produced from renewable forms of energy and a record amount of electricity produced by combined-cycle natural gas turbines.

The values that are currently shown should be deleted and not used for the following reasons:

1) <u>The values shown are not consistent with values shown in other published documents.</u>

Many documents and articles have been published over the past several years with source energy estimates. Among them are:

National Renewable Energy Laboratory NREL/TP-550-38617 "Source Energy and Emission Factors for Energy Use in Buildings" (June 2007)

American Gas Association EA 2009-3 "A Comparison of Energy Use, Operating Costs, and Carbon Dioxide Emissions of Home Appliances" (October 2009)

Environmental Protection Agency "Energy Star Performance Ratings Methodology for Incorporating Source Energy Use" (August 2009)

National Renewable Energy Laboratory NREL/TP-550-47246 "Building America Research Benchmark Definition" (January 2010)

International Code Council "International Green Construction Code" (March 2012)

U.S. Department of Energy Residential Dishwasher Energy Efficiency Technical Support Document, May 2012: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/67

U.S. Department of Energy Residential Furnace Fan Technical Support Document, June 2012: http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/41

The values in the IECC do not match and cannot be substantiated with any of these published documents.

2) Different fossil fuels have different upstream source estimates.

In the IECC, all fossil fuels are assumed to have the same multiplier. In other documents, there is a large variation in the upstream estimates that will have a significant impact on energy performance results. As one example, for fuel oil and propane, EPA Portfolio Manager uses a factor of 1.01 for both, while NREL used estimated values of 1.158 and 1.151.

3) The use of 3.16 for electricity is overstated for many parts of the United States and does not account for significant regional differences or the increase in the use of renewable power generation and combined cycle gas turbines.

In other publications and web sites, the estimates for electricity are shown on a national basis, a regional basis, or a state by state basis. This is due to the variety of electric generation techniques which have upstream energy losses that can vary by orders of magnitude based on local conditions, regional conditions, physical location, season, month, week, or day, as well as hourly fluctuations in the amount of sunlight or wind speed.

In the IGCC Table 602.1.2.1, there are 26 values shown for electricity, based on the power pool sub-region in which a building is located. The values in the IGCC table (which are based on outdated 2005 electric generation data) range from 1.76 to 3.82. Using the value of 3.16 will overstate the source estimate for electricity in 18 (or 69.2%) of the 26 power pool sub-regions shown in the table (that uses 2005 data). Using 2011 or 2012 data would show that the current values is more overstated for the 18 regions and likely to be overstated for other regions as well.

In summary, this code change will allow the code official to use the most recent data for current or projected source energy estimates, rather than use static and outdated values that do not correspond to the rapidly changing nature of energy production in the United States, and worldwide.

Cost Impact: This proposed code change proposal will not increase the cost of construction. There is no cost impact to increasing flexibility in the performance path.

R405.3-EC-ROSENSTOCK.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The code official is not qualified to make the determination of source energy multipliers. There is still a great disparity in understanding what is a level playing field for determination of energy use using site energy. Source energy has been fairly constant from year to year, the other metric is not.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Rosenstock, Edison Electric Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence *(proposed design)* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use-pricing in energy cost calculations.

> ~~**Exception:** The energy use based on site or source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multipliers shall be determined by the *code official*.~~

Commenter's Reason: This modification will improve and streamline the code for the following reasons:

1) It will remove any questions about where the currently incorrect and inaccurate "source" estimates were derived from.

In another action, the code development committee stated the following: "There is a wide amount of data which can be consulted in determining information about source energy multipliers. The industry must agree upon a source for the determination of source multipliers."

Unfortunately, there is no agreement about which value to use for source energy multipliers. Estimates will vary by city, county, state, and region. This modification will remove all such uncertainties.

2) It will focus the compliance on the metric that is of most importance to homeowners – energy costs.

Energy cost data and utility rate schedules are readily available at the local and state level.

3) It will prevent the "gaming" that occurs with source energy estimates that can lead to increased energy usage by homes.

In other documents, there is a large variation in the upstream estimates that will have a significant impact on energy performance results. As one example, for fuel oil and propane, EPA Portfolio Manager uses a factor of 1.01 for both, while NREL used estimated values of 1.158 and 1.151. Other sources show higher values. Using a different value will create results that vary by at least 15-20%.

For electricity, the differences are even more dramatic. In the IGCC Table 602.1.2.1, there are <u>26</u> values shown for electricity, based on the power pool sub-region in which a building is located. The values in the IGCC table (which are based on outdated 2005 electric generation data) range from 1.76 to 3.82. Using the value of 3.16 will overstate the source estimate for electricity in <u>18</u> (or 69.2%) of the 26 power pool sub-regions shown in the table (that uses 2005 data). Using 2011 or 2012 data would show that the current values are more overstated for the 18 regions and likely to be overstated for other regions as well.

4) It will create a level playing field for all types of energy and equipment that can be used in a home.

Using energy costs as the metric will ensure that designers and builders have the maximum incentive to install high efficiency equipment and take other actions to reduce energy costs for the homeowner, regardless of the type of energy that they are using in the home.

5) This is consistent with the approach that ASHRAE has taken.

ASHRAE decided, on a consensus basis, to use energy costs in its performance path for its Standard 90.1. In addition, energy costs are used in Standard 189.1, the ASHRAE Green Building Standard, which was also created through a consensus process.

RE160-13
Final Action: AS AM AMPC____ D

RE161-13
R405.3 (IRC N1105.3), Chapter 5

Proposed Change as Submitted

Proponent: Robby Schwarz EnergyLogic Inc. representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence *proposed design* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

Exceptions:

1. The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.
2. Compliance shall be based on comparative analyses between the *proposed design* and the *standard reference design* using scoring generated by RESNET Mortgage Industry National Home Energy Rating Standards. The *proposed design* shall comply with the code where the score of the *proposed design* is less than or equal to the score of the *standard reference design* provided that the analyses use identical geometry and the energy efficiency features for the *standard reference design* in Table R405.5.2(1) are used for the *standard reference design* analysis.

Add new standard to Chapter 5 as follows:

RESNET Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

RESNET Standards-2013 RESNET Mortgage Industry National Home Energy Rating Standards.

Reason: The current annual energy cost matrix for demonstrating code compliance is flawed and may demonstrate that a house that should pass the energy code, based on actual geometry and energy specifications, may not only because the energy costs in a region have changed. More and more jurisdiction and builders across the country are turning to performance scores to represent the efficiency of a home and to demonstrate code compliance. Performance scores in and of themselves do not necessarily demonstrate code compliance. However, if the score is imposed on the existing structure of the code as Exception #2 does, the score can reflect code compliance simply as a means of demonstrating passing and failing.

The current structure of the simulated performance path requires that the mandatory sections of the IECC be complied with, thus ensuring that house performance is maintained and that the score is only a measure to demonstrate compliance. In addition, exception #2 utilizes the code reference home as described in table 405.5.2(1) and therefore energy code compliance utilizing this pathway will have a score that is variable for each qualified home. This is accomplished through the 2015 IECC Reference Design outlined in table 405.5.2(1). When the builders proposed designed home is configured with the IECC reference design features and modeled using approved software, the resulting score becomes the basis for the performance score target for that home.
The EPA Energy Star program and the DOE Challenge Home program utilize this same matrix for demonstrating qualification for their programs and have demonstrated that the compliance path described in exception #2 will set the score target for the performance path equal to the performance that would be achieved if the prescriptive path was followed for each individual home. In this way jurisdictions can avoid developing a fixed value, or performance score, which really has no bearing on compliance and instead set the score threshold required for energy code compliance at the same value that the same house would earn if configured to the IECC prescriptive path, as outlined in table 405.5.2(1) Reference Design.

** Footnote to Energy Star and DOE Challenge Home program documents

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

Analysis: A review of the standards proposed for inclusion in the code, RESNET Standards, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R405.3-EC-SCHWARZ.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal was disapproved based upon confusion over what the RESNET standard actually proposed was, and what the title was. In addition, the draft standard is not in compliance with CP#28.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, representing EnergyLogic, Inc. requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence *proposed design* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design.* Energy prices shall be taken from a source *approved* by the *code official,* such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report. Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

Exceptions:

1. The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

2. This exception establishes criteria for using a simulated energy performance analysis resulting in an energy index score used to determine compliance with this code. This method shall include a whole house energy analysis resulting in comparative index scores unique to the reference home and proposed design. The proposed residences *proposed design* shall be shown to have an energy index score that is less than or equal to the index score of the standard reference design. The standard reference design shall be constructed utilizing the energy efficiency features in Table R405.5.2(1). The proposed design shall be constructed utilizing the desired energy features of the design professional. The comparison of the proposed design's energy features with the reference home shall only analyze the building components described in Table R405.5.2(1) that are common to both homes. ~~Compliance shall be based on comparative analyses between the *proposed design* and the *standard reference design* using scoring generated by RESNET Mortgage Industry National Home Energy Rating Standards. The *proposed design* shall comply with the code where the score of the *proposed design* is less than or equal to the score of the *standard reference design* provided that the analyses use identical geometry and the energy efficiency features for the *standard reference design* in Table R405.5.2(1) are used for the *standard reference design* analysis.~~

Commenter's Reason: The EPA Energy Star program and the DOE Challenge Home program utilize this same matrix for demonstrating qualification for their programs and have demonstrated that the compliance path described in exception #2 will set the target score for the performance path equal to or better than the performance that would be achieved if the prescriptive path for code was followed for each individual home. In this way jurisdictions can avoid developing a fixed value, or performance score, which really has no bearing on compliance and instead set the score threshold required for energy code compliance at the same value that the same house would earn if configured to the IECC prescriptive path, as outlined in table 405.5.2(1) Reference Design.

The EPA and DOE happen to utilize the HERS index score but it should be noted that there are a variety of index scoring systems being utilized across the country. Software approval and calculation would still have to be demonstrated per section R405.4 through R405.6.3. Software programs like REM Rate have built in the capability of comparing the proposed design to any reference home that is imaginable and developing an energy index score benchmark. They already have the code reference home built. Below is the process that Energy Star uses and attached are supplemental documentation. Below is an excerpt from the Energy Star program documentation that further demonstrates how this process works to demonstrate compliance.

ENERGY STAR Performance Path

The Performance Path provides flexibility to select a custom combination of measures for each home that is equivalent in performance to the minimum requirements of the ENERGY STAR Reference Design Home, Exhibit 1.10 Equivalent performance is assessed through energy modeling. Follow the steps below to use the Performance Path:

- This is exactly what the Simulated Performance path is currently doing. However The current annual energy cost matrix for demonstrating code compliance is flawed and may demonstrate that a house that should pass the energy code, based on actual geometry and energy specifications, may not only because the energy costs in a region has changed.

1. Determine the ENERGY STAR HERS Index Target, which is the highest numerical HERS Index value that each rated home may achieve to earn the ENERGY STAR. This target shall be specifically determined for each rated home by following the steps outlined in the ENERGY STAR HERS Index Target Procedure, Version 3 (Rev. 06), available on EPA's Website. This procedure defines how to configure the ENERGY STAR Reference Design Home and calculate……
2. …. configure the preferred set of energy measures for the rated home and verify that the resulting HERS Index meets or exceeds the ENERGY STAR HERS Index Target, as determined in Step 1. Note that, regardless of the measures selected, Mandatory Requirements for All Qualified Homes in Exhibit 2 are also required. ……

More and more jurisdictions and builders across the country are turning to performance scores to represent the efficiency of a home and to demonstrate code compliance. Performance scores in and of themselves do not necessarily demonstrate code compliance. However, if the score is imposed on the existing structure of the code as Exception #2 does, the score can reflect code compliance simply as a means of demonstrating passing and failing.

The current structure of the simulated performance path requires that the mandatory sections of the IECC be complied with, thus ensuring that house performance is maintained and that the score is only a measure to demonstrate compliance. In addition, exception #2 utilizes the code reference home as described in table 405.5.2(1) and therefore energy code compliance utilizing this pathway will have a score that is variable for each qualified home. This is accomplished through the 2015 IECC Reference Design outlined in table 405.5.2(1). When the builders proposed design home is configured with the IECC reference design features and modeled using approved software, the resulting score becomes the basis for the performance score target for that home.

RE161-13

Final Action: AS AM AMPC____ D

RE162-13
R405.4 (NEW) (IRC N1105.4 (NEW))

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R405.4 (N1105.4) Renewable energy. On-site energy production from renewables and waste shall be treated as a reduction in energy use. This includes, but is not limited to, photovoltaic and solar hot water systems that are standalone or integrated into the building, as well as renewable energy located on or adjacent to the building site. Both energy generated for use on the building site and energy sent back to the energy supply system shall be considered reductions in energy use.

Reason: This provides a mechanism for treating renewable energy generated at residences as an energy savings for that residence.

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

R405.4-EC-CONNER.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is substantial variability in defining what qualified renewable energy is; therefore, the code should remain the same until this can be worked out.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

W. Ronald Burton, PTW Advisors, LLC, representing Leading Builders of America requests Approval as Submitted.

Commenter's Reason: The recommendation by the Residential IECC Code Development Committee on a vote of 6-5 for disapproval of code change proposal RE162-13 should be overturned and the proposal approved as submitted. This proposal would simply allow on-site production of renewable energy to be treated as a reduction in building energy use, and result in a significant incentive to install these systems and reduce the amount of energy required from the power grid. It is incomprehensible that opponents of this proposal do not want to incentivize the installation of renewable energy systems on homes, but that is in fact what will result from the disapproval of this proposal.

Opponents of RE162-13 testified during the Code Development Hearings in Dallas that treating on-site renewable energy as a reduction in energy use for the purpose of IECC compliance would result in a "roll back" of energy efficiency measures currently required in the IECC. Of course, nothing could be further from the truth. Section R405 of the residential section of the IECC spells out compliance requirements in the performance method based on annual energy cost – that is, the proposed design can result in no more annual energy cost than a design built to the mandatory plus prescriptive requirements of the code. Energy COST is the operable metric in the performance compliance path. If a design results in no more energy cost, whether because of added insulation, more efficient windows, better HVAC equipment or the use of a photovoltaic system to reduce some of the energy demand from the power grid, the intent of the code has been met. Certainly, some would prefer more insulation be used or more expensive windows be installed, but the fact is that a solar energy system should be an equally valid choice in the energy design decisions.

We submit that it is incumbent on the opponents of RE162-13 to show ICC voting members how on earth an incentive to install a renewable energy system on a home built in compliance with Section R405 "rolls back" or in any way reduces the energy efficiency of the home to something less than a home without an installed renewable energy system.

Public Comment 2:

Don Surrena, CBO, National Association of Home Builders requests Approval as Submitted.

Commenter's Reason: This proposal provides builders another "tool" to achieve the energy efficiency levels required by this code. This is an energy neutral proposal that gives designers, builders and consumers freedom to optimize the construction of energy efficient buildings.

With the increase in stringency of the code, there is a higher likelihood of on-site renewable energy being more cost-effective than some of the prescriptive requirements. This proposal will potentially allow builders to lower the cost of new construction without using more energy.

RE158-13

Final Action: AS AM AMPC____ D

RE163-13

R405.4.2 (IRC N1105.4.2), R405.4.2.1 (NEW) (IRC N1105.4.2.1 (NEW)), R405.2.2 (NEW) (IRC N1105.4.2.2 (NEW))

Proposed Change as Submitted

Proponent: Robby Schwarz EnergyLogic Inc., representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.4.2 (N1105.4.2) Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based upon the as-built condition of the building, shall be submitted to the *code official* before a certificate of occupancy is issued by the *code official*. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. ~~The compliance documentation shall include the following information:~~ Where the *proposed design* of a building could be built on different sites where the cardinal orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit, shall be based upon the worst case orientation, worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis.

~~1. Address or other identification of the residence;~~
~~2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design,* and shall document all inputs entered by the user necessary to reproduce the results;~~
~~3. Name of individual completing the compliance report; and~~
~~4. Name and version of the compliance software tool.~~

R405.4.2.1 (N1105.4.2.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R405.4.2.2 (N1105.4.2.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building passes the performance matrix for code compliance and the energy saving features of the buildings.

4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

~~**Exception:** Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements~~

Reason: Jurisdictions, Builders, third party inspection companies and others are not clear of the process for completing and utilizing the simulated performance path. With all pathways through the energy code one must in essence declare how they will meet the intent of the code. For the prescriptive path they simply say they are going prescriptive, for the UA trade off path they submit a document such as a RESCheck report, and for the simulated performance path they must currently submit a document demonstrating that the annual energy cost of the proposed design are less than or equal to the same home if it were built with the reference design specification. It becomes unclear how one demonstrates that they have carried out their proposed design. The revisions proposed for this section clearly outlines a process by which the proposed design is submitted, inspections take place, and additional analysis is preformed to ensure that the proposed design was achieved or bettered for the purposes of compliance.

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

R405.4.2-EC-SCHWARZ.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides clarity for interested parties to understand what the process is for utilizing the performance path.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.4.2 (N1105.4.2) Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report ~~based upon~~ demonstrating that the as-built condition of the building complies with Section R405, shall be submitted to the *code official* before a certificate of occupancy is issued by the *code official*. ~~Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.~~

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. For buildings ~~W~~where the *proposed design* ~~of a building~~ could be built on different building sites ~~where the cardinal orientation of the building on each site is different~~, compliance of the *proposed design* ~~for the purposes of the application for the building permit,~~ shall be demonstrated based upon the worst case orientation, worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis for each building using a single *proposed design* for multiple building sites.

R405.4.2.1 (N1105.4.2.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other unique building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.

3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1) and all mandatory code requirements that must be met. The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R405.4.2.2 (N1105.4.2.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other unique building site identification
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building satisfies the requirements of Section 405, including all of the mandatory and ~~passes the~~ performance requirements ~~matrix~~ for code compliance, and listing the ~~energy saving~~ features of the buildings that affect energy efficiency.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

Commenter's Reason: We recommend approval of RE163 as modified by this public comment. While we support RE163 as drafted as providing additional detail on how to determine and enforce compliance under the performance path, we think it can be further improved with the additional clarifying language in this public comment. For example, it is important that performance path compliance certification includes all of the requirements of section 405, including the mandatory requirements of the code (see section 405.2).

Public Comment 2:

W. Ronald Burton, PTW Advisors, LLC representing Leading Builders of America requests Disapproval.

Commenter's Reason: The recommendation by the Residential IECC Code Development Committee on a vote of 6-4-1 for approval as submitted of code change proposal RE163-13 should be overturned and the proposal disapproved. This proposal would require a host of new compliance documents for projects wishing to use the simulated performance compliance path outlined by Section R405. These added compliance report materials would be required by the designer, builder and/or homeowner both for building permit application and before issuance of the certificate of occupancy, and are unnecessary to show compliance with Section R405. These added requirements serve only to create hurdles for the users without any demonstrated benefits.

The proponent states in the reason statement that "Jurisdictions, builders, third-party inspection companies and others are not clear of the process for completing and utilizing the simulated performance path." We submit that it is hard to imagine how all these folks are unsure how compliance is demonstrated in Section R405 when compliance is defined in one easy-to-understand sentence within Section R405.3. It says: "Compliance based on simulated energy performance requires that a proposed residence (proposed design) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*."

Section 405 also spells out how software used to demonstrate compliance is to be verified, what should be provided to the code official in the compliance report, and the calculation procedures that must be used. Code officials are also authorized in this Section to approve performance analysis tools based on meeting specific thresholds that may be required by the AHJ. How much easier do we want compliance to be?

The proponent's answer is to require lots of new reports, disallow any batch sampling if that is deemed appropriate by the code official, and require users to base calculations on "worst case" assumptions for "designs that "could be built on different sites…" even though submittal of a model design for construction on some future site would only be allowed if specifically approved by the code official.

This is an overly complicated and unnecessary code change and we urge disapproval by the ICC voting members.

RE163-13

Final Action: AS AM AMPC____ D

RE164-13
Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing[a]	~~Total area[b] =~~ ~~(a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area.~~ - ~~(b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.~~ <u>As proposed</u>	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design) External shading: none	As proposed 0.92-(0.21 × SHGC as proposed) As proposed

For SI: 1 square foot = 0.93 m^2, 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m^2, 1 gallon (U.S.) = 3.785 L, °C = (°F-3)/1.8, 1 degree = 0.79 rad.

(Portions of Table not shown remain unchanged)

a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

b. ~~For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:~~

~~*AF* = A_s × *FA* × *F*~~

~~where:~~

~~*AF* = Total glazing area.~~

~~A_s = Standard reference design total glazing area.~~

~~*FA* = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 × below-grade boundary wall area).~~

~~*F* = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.~~

~~and where:~~

~~Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.~~

~~Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.~~

~~Below-grade boundary wall is any thermal boundary wall in soil contact.~~

~~Common wall area is the area of walls shared with an adjoining dwelling unit.~~

~~*L* and *CFA* are in the same units.~~

Reason: The principals should be: Keep it simple. Keep it energy efficient. Simple is setting a specific window requirement and having it apply to the whole performance approach, as is done in the prescriptive approach. Simple is presuming that the glass area for the performance calculation is the same as the glass area in the proposed new home. Simple is removing unneeded calculations. This change also has the effect of allowing changes from plans to the home as constructed without recalculation.

As windows get more efficient, the window area matters less. In some situations more glass better. In northern climates windows at the edge of what is now in the market may be as good as a "normal" wall. Therefore the impact of window area is decreased and not worth the calculation.

Removal of the window area calculation was the major simplification in the 2003 IECC simplification needed to get to the 2006 IECC. The 2006 IECC simply says use as much window as you want, just make it energy efficient windows. Requiring a specific window for each climate zone created huge markets for those specific levels of efficiency. Window makers respond by making a energy efficient windows a commodity, with a significant fall in the cost for energy efficient windows. The effect has been so strong that the building code has repeatedly pushed Energy Star to move to new levels.

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

R405.5.2(1)T #1-EC-CONNER.DOC

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: This changes the performance logic to a simple presumption that the glass area is the same in the standard referenced design as in the proposed design, and allows the design to go forward without the conflicting penalty if you do (go over 15%) and no reward if you don't (go over 15%.)

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval.

Commenter's Reason: We recommend disapproval of RE164. RE164 should be disapproved because it permits a reduction in overall energy efficiency in those homes with above-average (>15%) glazing area that use the performance path for compliance (under the prescriptive path, there is no limit or adjustment based on glazing percentage). We believe that where builders or design professionals use the performance path to verify compliance, there must be reasonable backstops to control the overall efficiency of the building. The glazing area assumption has been incrementally improved in previous code change cycles, but the effect since 2006 has required homes with high glazing area percentages to make up for the energy losses elsewhere in the building.

The IECC performance path actually contains two limitations on the glazing area assumption – one for homes with below-average glazing area and one for above-average glazing area – to help ensure the use of efficient windows in all buildings. This is not a "conflicting penalty" as described by the residential committee reason statement, but a backstop that recognizes that because performance path incentives are different for homes with high versus low glazing areas, the backstops must be different as well.

Low glazing area (15% of conditioned floor area and below). In the current code, where the proposed home design has lower than average glazing area, the proposed home is compared against a standard reference design home with the same glazing area percentage. In other words, a proposed home with 12% glazing area must achieve the same energy efficiency as a standard reference home with 12% glazing area. This approach ensures that there is no unwarranted trade-off loophole created by those homes that typically have lower-than-average glazing area that would allow trading away other efficiencies of the thermal envelope, such as wall insulation. Common examples of homes with low glazing area include townhouses, condos, multifamily buildings, or low-income housing. Other proposals simply to eliminate the protection offered by this provision were recommended for disapproval by the IECC committee.

High glazing area (over 15% of conditioned floor area). For homes with above-average glazing area, the proposed home is compared against a standard reference design with 15% glazing – essentially requiring that homes with lots of windows must achieve the same overall efficiency as a standard reference home with 15% glazing (or switch to the prescriptive path).

The net effect of these two assumptions is that all homes, whether they have high or low glazing area percentages, will have reasonably efficient windows and insulation. Although RE164 would not impact the low glazing area backstop, it would completely remove the backstop for high glazing area, essentially allowing designers to take advantage of both the extreme flexibility of the performance path *and* an unlimited amount of glazing area. While we believe that the low-glazing-area protection is the most important, we would like to retain the high-glazing area protection too. For those who want to build homes with higher glazing areas, the prescriptive path allows for any amount of windows when using the prescriptive window requirements.

Public Comment 2:

Neil Leslie, Gas Technology Institute, representing self, requests Disapproval.

Commenter's Reason: The intent of the IECC is clearly defined.

> **"Intent.** This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances."
>
> Source: 2012 IECC. Sections C101.3 and R101.3.

The code focus is "energy use… over the useful life of the building". Buildings will perform to the requirements of this code for a long time. So the intent of the code focuses on "energy use" over the life of the building. Under the performance path, the IECC compares the energy use of a baseline building to the energy use of a proposed building. The baseline building characteristics need to be carefully designed and sufficiently stringent to balance the energy performance objectives and the flexibility of a performance approach to designs.

By shifting from a single baseline level of wall performance to a floating level of performance for the reference building, the proposal undermines a critical aspect of the code related to tradeoffs and minimum stringency levels. The assertion that today's best windows are essentially equivalent to fully insulated walls is not technically valid. By allowing higher levels of glazing to be considered equivalent to higher levels of insulated walls without penalty, RE164-13 is inconsistent with the stated intent of the IECC above and the stated goal of to providing "model code regulations that will result in the optimal utilization of fossil fuel and nondepletable resources in all communities, large and small."

In this case, simple introduces bias, increased energy use, and misleading signals to consumers. Keeping the code simple by ignoring window area is not consistent with the objectives of the IECC. RE164-13 violates the principle that things should be as simple as possible but no simpler, and is inconsistent with the equitable single baseline system performance calculation methodology that is necessary to establish efficient energy performance compliance requirements while being agnostic about technology approaches.

Public Comment 3:

Jeff Sonne, Florida Energy Center requests Disapproval.

Commenter's Reason: RE164-13 is inconsistent with the direction taken by all other programs having reference homes. DOE's Builder's Challenge program and EPA's EnergyStar program take exception with IECC and limit the percent glass of the reference home so that homes that use more energy due to large window areas have to make it up. It is difficult to consider the IECC as a serious energy code with unlimited glass areas receiving no penalty. In our experience it is large homes that tend to have 25% to 40% glass-to-floor area, requiring substantially more heating and air conditioning. Windows are better than they used to be, but they are a weak component in the building envelope. The agreement made in 2003 was erroneous. The prescriptive method should also have a window area limitation forcing the UA or performance method. Please don't make the code worse, reject RE164-13. We still stand behind RE181-13 as an appropriate solution.

RE164-13
Final Action: AS AM AMPC____ D

RE165-13

202 (NEW) (IRC N1101.9 (NEW)), Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Gary MacFadden, National Electrical Manufacturers Association (NEMA) (gary.macfadden@Nema.org)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems[f, g]	As proposed for other than electric heating without a heat pump. Where a proposed design utilizes grid-interactive electric thermal storage, the standard reference design shall be as proposed. Where the proposed ~~design utilizes electric heating without a heat pump~~ electric heating design does not utilize a heat pump or grid-interactive electric thermal storage, the standard reference design shall be an air source heat pump in accordance with Section C403 of the International Energy Conservation Code. Capacity: sized in accordance with Section R403.6	As proposed

(Portions of Table not shown remain unchanged)

Add new definition as follows:

GRID-INTERACTIVE ELECTRIC THERMAL STORAGE (ETS). A device designed for the storage of electrical energy that has been converted into heat, and that has the ability to turn on or off in response to the needs of the utility or the electric grid.

Reason: As it is written, Table R405.5.2(1) requires a modeler to assume a heat pump system whenever a designer proposes to use "… other than electric heating without a heat pump," *i.e.*, electric resistance or electric radiant heating in a new residence. While perhaps serving a valuable function in some fashion in the past (elimination of gaming where a modeler assumes an electric furnace for the reference house and then proposes a heat pump allowing a less stringent envelope), the limitation on use of ERH in the modeling is overly restrictive, particularly as it relates to Grid-interactive electric thermal storage ("ETS"). The definition is being added because the IECC does not currently have a definition for grid-interactive electric thermal storage.

Substantiation: ETS systems have significantly different operational and energy consumption characteristics versus other types of heating systems. These differences are at the core of the rationale behind this code change proposal. In particular, ETS systems have the ability to respond to the needs of the utility and electric grid by storing energy during preferential times of the day or night and turn on or off as needed. This is very beneficial in improving efficiency of power generation, transmission and distribution, for integration of renewable energy and for providing grid power balancing services. Unfortunately, ETS systems are generally lumped together with traditional heating systems (as they are in the existing code language).

Language like that found currently in Table R405.5.2(1) that requires a modeler to assume a heat pump in the reference house, even if the designer intends to use electric resistance heating, including an ETS in the proposed house, has been in the IECC for many years. The justification cited historically for that modeling limitation is:

- That modelers will game the system by assuming ERH in the reference house but a heat pump in the proposed house, thereby allowing a less stringent envelope, and/or
- That a heat pump will consume on the order of half the energy of an electric furnace installed in the same house so the code should discourage designers from specifying ERH and instead should specify a heat pump.

With respect to the former of these justifications, the current language requiring the same equipment to be modeled in both the reference and the proposed designs denies any opportunity to game the system as described above.

That leaves the latter as the potential justification for the restriction against modeling the use of electric resistance heating in the reference house. To some extent, this seems appropriate. If, for instance, in some heating dominated climates, a designer is proposing to install a ducted electric furnace with central air-conditioning, then incenting that designer to use a heat pump instead of an electric furnace might be expected to save some amount of energy at a relatively modest cost.

But there are significant operational and energy consumption characteristics that distinguish ETS from traditional heating systems (whether fueled by electricity, gas, oil or other fuel) as described in more detail below.

Grid-interactive electric thermal systems ("ETS"). ETS have significantly different operational and energy consumption characteristics from traditional electric and fossil heating systems.

Thermal battery. Electric utilities dispatch their generators in the order from the most cost efficient (base load generation) to the least cost efficient (peaking load generation). ETS complements the efficient dispatch of generation by utilities by allowing the storage of energy that is produced more efficiently for use later, and by avoiding the requirement to operate less efficient generators at peak load conditions. ETS accomplishes this feat by charging (heating bricks, water, or other storage media) at times when utilities have excess capacity. Often this is at night but it can vary between utilities. Because the system is grid-interactive, an ETS can charge at times that are optimum for the utility, allowing utilities to efficiently manage their peak demands and their customer costs. Heat that is stored for later use effectively makes ETS a thermal battery.

Renewable energy. ETS is a unique complement to the generation of electricity from renewable energy like wind and solar. Many times peak power production from renewable energy sources does not coincide with a utility's demand for electricity. As an example, wind generation usually peaks at night when demand for energy is not usually the greatest. For that reason, Bonneville Power last year was forced to curtail the generation from wind generators at certain times because it didn't need all the electricity the wind generators were producing! ETS is a good fit for storing excess renewable energy and has been successfully deployed in Bonneville's service territory as well as the service territory of other electric utilities.

Reduces winter peak. When electrical demands on a utility's system grow, it is forced to dispatch less efficient generators to meet that demand, so to the extent demand is *reduced* the utility avoids costs (that would ultimately be passed on to customers) and saves energy. ETS allows the storage of energy produced by more efficient generators.

Replaces fossil fuel in utility grid control. When electrical demand on a utility's grid changes (up or down), the most immediate system response is for the grid's frequency to drift away from ideal (60 cycles per second). To control these frequency excursions, utilities have traditionally operated fossil fuels generators to add voltage to the grid to raise the frequency as it falls away from 60 cycles. Grid-interactive ETS can be dispatched in lieu of fossil fuel generators to remedy frequency excursions, thereby saving energy and costs. According to a Kema report, usage of a non-carbon emitting resource such as ETS for providing regulation services can reduce carbon emissions for regulation by nearly 65%.

ETS offer significant benefits to customers, including the ability to store renewable energy, the ability to reduce utility costs, and the ability to reduce the consumption of fossil fuel by utilities in the regulation of system frequency.

Bibliography

See article at http://www.pjm.com/about-pjm/exploring-tomorrows-grid/electricity-storage.aspx?p=1 for information on the value of ETS in the PJM Interconnection service territory.

See article at http://www.sustainablebusinessoregon.com/articles/2012/04/bonneville-power-calls-for-first-wind.html?page=all for information on Bonneville Power curtailment of wind generation amounting to almost 100,000 MWH's in 2011.

See Kema Consulting report (Commissioned by the U.S. Department of Energy under the supervision of Sandia National Laboratory) noting significant reduction in carbon emissions at http://prod.sandia.gov/techlib/access-control.cgi/2008/088229.pdf.

See http://www.steffes.com/off-peak-heating/ets.html for more information on utility benefits of WTS, including energy savings associated with thermal storage and frequency regulation.

See Sandia National Laboratory website at http://www.sandia.gov/ess/ for information on the contributions of energy storage to electric grid stability.

For a detailed description of frequency regulation in North America *see* Department of Energy / National Energy Technology Laboratory Report **Frequency Instability Problems in North American Interconnections, DOE/NETL-2011/1473, Final Report dated May 1, 2011** found at http://www.netl.doe.gov/energy-analyses/pubs/TransmissionFreqProb.pdf

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

R405.5.2(1)T #1-EC-MCFADDEN.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: In order for Grid Interactive Electric Thermal Storage to be utilized in this code for the performance path, there needs to be more details and rules, including technical standards and specifications for this system.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Deichert, Steffes Corporation, representing self, requests Approval as Submitted.

Commenter's Reason: Grid-interactive Electric Thermal Storage (GETS) systems, while a form of Electric Resistance Heating, are more so viewed as "Distributive Thermal Energy Batteries" that bring very significant benefits to Power Companies, Consumers and the Environment. GETS is an exciting and evolving technology whose benefits are not yet fully appreciated in the energy efficiency community. This proposal asks for the addition of a definition for Grid-interactive Electric Thermal Storage as well as modifications to table R405.5.2(1) which would allow GETS technologies, where proposed, to be used as the standard reference.

In the original RE165 proposal, significant information was provided regarding the benefits of GETS technologies. GETS systems have substantially different operational and energy consumption characteristics versus other types of heating systems. These differences are at the core of the rationale behind this code change proposal. In particular, ETS systems have the ability to respond to the needs of the utility and electric grid by storing energy during preferential times of the day or night and turn on or off as needed. This is very beneficial in improving efficiency of power generation, transmission and distribution, for integration of renewable energy and for providing grid power balancing services. Unfortunately, ETS systems are generally lumped together with traditional heating systems (as they are in the existing code language).

Power Regulation and Ancillary Services. GETS systems are very low-cost, fast acting energy storage systems which utilities can use to balance supply and demand while also providing frequency regulation and other ancillary services. The alternative is for utilities to use inefficient and slow responding fossil fuel generators to accomplish the same. Studies have shown that fast acting storage resources, like GETS, can reduce carbon emissions associated with frequency control by up to 65%.

Renewable energy integration. GETS is a unique complement to the generation of electricity from renewable energy like wind and solar. There is a rapidly growing amount of renewable power being added to the electric grid, so much that in some areas there is excess power that needs to be curtailed, especially during night time hours. GETS systems can store this green energy and productively use it rather than having it curtailed or "spilt".

Peak Power and Demand Reduction. GETS systems help better utilize existing electric generation, transmission and distribution infrastructure, thereby improving efficiency and reducing the need for additional generation resources.

Consumer Benefit. GETS offer significant benefits to consumers, including the ability to store renewable energy, the ability to reduce utility costs, and the ability to reduce the consumption of fossil fuel by utilities in the regulation of system frequency. Generally consumers save 50% or more through savings passed to them in their electric rate by utilizing GETS systems in their home or business.

While this proposal was narrowly disapproved by the Code Committee, it was suggested by a committee member we bring this proposal back during the public comment period. The benefits of GETS are very significant for Consumers, Utilities and the Environment. It is important that the IECC includes language which not only welcomes, but encourages the use of this technology.

RE165-13

Final Action: AS AM AMPC____ D

RE166-13
Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems [f, g]	~~As proposed for other than electric heating without a heat pump, Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC-Commercial Provisions.~~ Fuel type: same as proposed design Efficiencies: Electric: air-source heat pump with prevailing federal minimum standards Non-electric furnaces: natural gas furnace with prevailing federal minimum standards Non-electric boilers: natural gas boiler with prevailing federal minimum standards Capacity: sized in accordance with Section R403.6	As proposed As proposed As proposed As proposed As proposed
Cooling systems [f,h]	~~As proposed~~ Fuel type: Electric Efficiency: in accordance with prevailing federal minimum standards Capacity: sized in accordance with Section R403.6	As proposed As proposed

Service water heating [f,g,h,i]	~~As proposed~~ Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum standards Use: gal/day = 30 + (10 × *Nbr)* *Nbr* = Number of bedrooms Tank temperature: 120°F ~~Use: same as proposed design~~	As proposed As proposed Same as standard reference Same as standard reference ~~gal/day = 30 + (10 × *Nbr)*~~

(Portions of table not shown remain unchanged)

Reason: This amendment serves to retain energy neutral equipment trade-off provisions from the 2006 International Energy Conservation Code (IECC) for the heating systems, cooling systems, and service water heating. By retaining these, builders have an opportunity to optimize a code-compliant house design by using energy efficient equipment. Quite often, the use of this high efficiency equipment provides a more cost effective solution to achieve code compliance. Eliminating this ability discourages the concept of the "house as a system" approach which is a cornerstone of building science.

Rejecting this amendment will create a negative impact on the installation of state-of- the-art, energy efficient equipment. It will increase the cost of construction by driving builders to often use less efficient equipment while increasing the cost of construction.

Significant improvements in the efficiency of HVAC and water heating equipment have been made in the last 20 years. With the increased emphasis on new and improved technologies, this trend is expected to continue and will result in even higher energy savings in future years. If builders are forced to comply with the energy code by installing requirements which are not cost-effective, there will be a resistance to install higher efficiency equipment. This could end up hurting energy efficiency in the long term, consumers which have non-condensing furnaces will be less likely to install a higher efficiency condensing replacement furnace because of the additional cost to run an exhaust vent.

Industries such as log home manufacturers may no longer be able to construct to projected higher envelope requirements. The combination of increases in envelope thermal requirements, building tightness and duct tightness combined with the elimination of energy neutral trade-offs pose a serious threat to the viability of the log home industry. There are practical limitations to the thickness of log home walls, increases in the log diameter has a exponential increase in the cost of the logs making log walls with a U-factor of 0.082 or lower prohibitively expensive.

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

R405.5.2(1)T #1-EC-SURRENA.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The homebuillders need flexiibility in meeting energy conservation requirements of this code. Equipment trade-offs provide this additional flexibility. The committee was also persuaded by the arguments concerning adoptability of the code. It is known that these trade-offs are being written in to local amendments. In a growing green industry, equipment trade-offs could inspire more innovation.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Don Surrena, representing National Association of Home Builders, and Tim Ryan, representing the International Association of Building Officials, request Approval as Submitted.

Commenter's Reason: This amendment serves to retain energy neutral equipment trade-off provisions from the 2006 International Energy Conservation Code (IECC) for the heating systems, cooling systems, and service water heating. By retaining these, builders have an opportunity to optimize a code-compliant house design by using energy efficient equipment. Quite often, the use of this high efficiency equipment provides a more cost effective solution to achieve code compliance. Eliminating this ability discourages the concept of the "house as a system" approach which is a cornerstone of building science.

The residential portion of the IECC is the only code that exists which does not allow energy neutral equipment trade-offs. The commercial section of the IECC, ASHRAE 90.1, ASHRAE 90.2 and all above code programs such as Energy Star, the ICC 700 also provide full credit for inclusion of mechanical equipment with higher efficiencies than the Federal minimum.

Industries such as log home manufacturers may no longer be able to construct to projected higher envelope requirements. The combination of increased envelope thermal requirements, building tightness and duct tightness combined with the elimination of energy neutral trade-offs pose a serious threat to the viability of the log home industry. There are practical limitations to the thickness of log home walls. Increases in the log diameter has a exponential increase in the cost of the logs making log walls with a U-factor of 0.082 or lower prohibitively expensive.

Energy consumption at the utility meters is what matters; RE166 will not change the efficiency of the code. This proposal is now more important than ever; with sizable increase in stringency in the two most recent editions of the IECC, equipment tradeoffs will allow builders to make better decisions as to the best way to achieve the code level of efficiency. Many of the new requirements are not cost effective and create a negative impact on the consumer. Having this trade-off available can correct for problems that have been included in the latest version of the code without sacrificing energy efficiency.

The reason statement from the Committee Action Hearings sums it up well:

"The homebuilders need flexibility in meeting energy conservation requirements of this code. Equipment trade-offs provide this additional flexibility. The committee was also persuaded by the arguments concerning adoptability of the code. It is known that these trade-offs are being written in to local amendments. In a growing green industry, equipment trade-offs could inspire more innovation."

This proposal is critical to increase the adoptability, usability and enforceability of the IECC.

Public Comment 2:

Craig Conner, Building Quality, representing self, requests Approval as Submitted.

Commenter's Reason: In addition to restoring needed flexibility, RE166 corrects a contradiction of Federal law in the IECC. Federal law requires that energy code performance calculations use federally mandated minimum efficiencies for equipment as the baseline for calculating the energy use of the minimum code compliant home. The IECC's Standard Reference Design, which is the IECC's baseline for performance calculations, therefore is required to use the Federal minimum equipment efficiency. Specifically, the Standard Reference Design requirement for "*heating systems*", "*cooling systems*" and "*service water heating*" in the IECC's Table R405.5.2(1) to be "*as proposed*" violates Federal law. RE166 changes the Standard Reference Design equipment efficiency from "as proposed" to "federal minimum standards" and thereby makes the IECC consistent with Federal law and therefore more adoptable by states local jurisdictions.

The specific Federal law is Section 6297(f)(3)(D) of the Energy Policy & Conservation Act (EPCA) as amended by the National Appliance Energy Conservation Act (NAECA). This requires Federal minimum efficiency standards be used in energy code performance calculations for "covered products". Residential furnaces, air conditioners, heat pumps and water heaters are "covered products". Section 6297(f)(3)(D) allows "baseline building designs", such as the IECC's "Standard Reference Design", for performance calculations <u>only</u> if the baseline is the Federal minimum equipment efficiency standards. NAECA expressly preempts state and/or local building codes for new construction from using the 2012 IECC's "as proposed" in baseline energy-code performance calculations. This provision requires that a code with an energy performance calculation for a residential furnace, air conditioner, heat pump, or water heater use the Federal minimum equipment efficiency standard as its baseline. Specifically the Federal law states that for building designs that contain a "covered product" that "the baseline building designs are based on the efficiency level for such covered product which meets but does not exceed .. " the Federal energy conservation standard. In plain language "meets but does not exceed" is the same as saying "equals". When adopted by a jurisdiction the IECC's Table R405.5.2(1) would seem to violate Federal law by having a baseline equipment efficiency that is "as proposed".

RE166 will resolve the conflict with Federal law by setting the Standard Reference Design equipment efficiency to be the "federal minimum standards" as it was in the 2006 IECC.

NAECA is codified into the U.S. Code in title 42, chapter 77, subchapter III. The Federal law can be viewed on the web at:
http://www.gpo.gov/fdsys/pkg/USCODE-2011-title42/pdf/USCODE-2011-title42-chap77-subchapIII.pdf
The relevant section is on page 5849, left column, in section "(D)". Fair warming- It is in legal language.

Public Comment 3:

Vickie Lovell, Intercode, Inc., representing self, requests Approval as Submitted.

Commenter's Reason: Restoring the equipment trade-off from the 2006 IRC promotes flexibility and undoes a needless restriction on how code compliance can be achieved. Without this provision, the code is an impediment to design innovation, and a disincentive for opportunities of cutting-edge equipment technologies and related mechanical components. That is the opposite of promoting whole house energy performance.

Public Comment 4

Jay Crandell, P.E., ARES Consulting, representing the Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment

Modify the proposal as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATION FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN[a]

a. The proposed design shall use U-factors for the opaque building thermal envelope building components that are no more than 15% greater than those included in Table R402.1.3 as determined on an area-weighted average basis for each component .

(Remainder of table contents unchanged; re-label existing footnotes accordingly)

Commenter's Reason: It is important to promote reasonable flexibility in achieving energy efficiency.

RE166 does not set a reasonable baseline for equipment efficiency or reasonable flexibility. Some of the federal minimums for equipment efficiency are changing but others are not, leaving minimums at unreasonably low levels that have long been out paced by the market. Until the federal minimums are in line with commonly used equipment efficiencies in the market place they should not be allowed as a baseline in the code.

When using the performance path on a purely "energy neutral" basis without limitation or discretion, unintended consequences can occur that are not adequately prevented by a purely "energy neutral" approach to performance (without technically sound limitations). The potential for over-reaching reductions in building envelope thermal efficiency that are enabled by RE166-13 can have unintended consequences. Some of these consequences that justify reasonable limitations on trading off the opaque thermal envelope in the performance path include:

1. An imbalance or over-reliance on one means of conserving energy which has a shorter service life, can result in a much less robust means of achieving energy efficiency. Therefore service life should be taken into consideration when establishing appropriate limitations on tradeoffs.
2. The potential for unlimited reductions in thermal envelope efficiency can result in poorer performance in ways that are not accounted for in the performance path. For example, when significantly reducing the building envelope insulation, interior surfaces are subject to larger temperature gradients dramatically affecting occupant comfort. This often results in changing of the set-point temperature further degrading the energy performance of the building. Also, in the case of power outages or equipment failure, it is more difficult to maintain tolerable living conditions.

Finally, it is important to recognize that other sections of the code also impose reasonable limitations on the performance path to address unintended consequences that are not accounted for in a purely "energy neutral" view of the performance path. For example, Section R402.5 imposes a limitation on the U-factors for fenestration. Without such limits on the performance path, unintended consequences will occur that have other than "energy neutral" performance implications (e.g., excessive condensation on windows in colder climates and occupant discomfort leading to corrective actions such as increasing energy consumption by altering the set-point temperature). Similarly, Section R405.2 contains a limitation on minimum duct insulation in unconditioned spaces. Such precedents for limitations on performance simulation methods go beyond the energy code. For example, a 15% limit on reduction of wind loads is imposed on wind tunnel simulations unless worst-case scenarios are considered that demonstrate the reductions are "safe". Therefore, a similar approach is taken in this public comment.

It is important to recognize that this public comment provides guidance that ensures energy efficiency is implemented in a distributed fashion such that unintended consequences are avoided and trade-offs do not result in an imbalanced overall building energy efficiency design.

Public Comment 5

Neil Leslie, Gas Technology Institute, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R405.5.2(1)
SPECIFICATION FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems[f~~, g~~]	Fuel type: ~~same as proposed design~~ Electric Efficienc~~ies~~y: ~~Electric:~~ air-source heat pump with prevailing federal minimum standards ~~Non-electric furnaces: natural gas furnace with prevailing federal minimum standards~~ ~~Non-electric boilers: natural gas boiler with prevailing federal minimum standards~~	
Cooling systems[~~f, h~~g]		
Service water heating[~~f, g,h,i~~]	Fuel type: ~~same as proposed design~~ Electric	

~~f. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.~~
f~~g~~. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.
g~~h~~. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
~~i. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.~~

Commenter's Reason: The IECC has already chosen the right metrics for energy performance in Section R405.3:

1. Energy cost budget (for adopting authorities mainly concerned about the homeowner's economic objectives), or
2. Source energy budget (for adopting authorities mainly concerned about the homeowner's energy consumption impacts on primary energy consumption).

However, for these to be implemented in a fair and equitable manner, one critical additional step is needed: A single baseline building energy budget. This amendment provides the critical single baseline budget methodology to implement this code correctly and equitably. It is only by implementing the correct metrics correctly - i.e. through the single baseline methodology – that the IECC can avoid adverse effects and unintended consequences on users of the code.

This amendment corrects the flawed multiple baseline systems tradeoff methodology in RE166-13. It establishes an all electric building as the starting point for all energy use comparisons under R405.3. Without these changes, it is not possible for the multiple baseline systems methodology in RE166-13 to be "energy neutral".

Any multiple baseline systems methodology is inherently biased against fuel choices. You must have a single baseline. Multiple baseline systems are also biased against any technology options that might have lower energy cost and higher source energy efficiency. This is especially true for water heating but also applies to space heating in northern climates.

As currently written, RE166-13 establishes the reference design building energy cost budget or source energy budget AFTER fuel choices are made. Therefore it is energy biased because it treats different energy forms as if they are equal when they are not, thereby always favoring one fuel choice over another inappropriately.

The multiple baseline system methodology in RE166-13 is inconsistent with the stated intent of the IECC to provide *"model code regulations that will result in the optimal utilization of fossil fuel and nondepletable resources in all communities, large and small."* The current provisions treat various technology options as equivalent to each other even though there are demonstrable and meaningful differences in energy cost and source energy use among the fuel choice and technology options, especially for electric resistance and natural gas options. This results in suboptimal utilization of fossil fuels because significantly more coal and natural gas are burned in power plants to provide electricity for inefficient qualifying electric technologies than would be consumed by burning natural gas directly in the home using the more source energy efficient and lower energy cost gas technology.

As currently written, RE166-13 inserts a dangerous "fuel bias" in the code that this amendment fully corrects by changing to fuel blind, single baseline compliance provisions.

The revised tables and text completely decouple the proposed building design choices from the standard reference design building's energy cost or source energy performance requirement. The reference energy and technology choices in the revised section were selected to provide a practical and effective requirement to meet the intent of the standard while still offering appropriate incentives for the best available technologies based on their energy cost or source energy benefits. By shifting to electric technologies for all baseline systems, this amendment allows determination of an equitable energy cost or source energy budget at a reasonable level of performance using compliant electric technology options.

The most useful comparison illustrating the inherent flaw in the RE166-13 methodology is a minimally compliant electric storage water heater compared to a minimally compliant gas storage water heater. Homes using NAECA minimum efficiency electric resistance storage water heating qualify equally as a NAECA minimum gas storage water heater, even though both the annual energy costs and primary energy consumption are much higher for the resistance water heater than for the gas water heater (typically twice as high). Based on a typical home in the midwest, annual energy use for an NAECA minimum electric resistance water heater is 3,920 kWH, while a NAECA minimum gas water heater uses 205 therms. Using average Missouri energy rates available from EIA of $0.098 per kWh and $1.05 per therm, the electric water heater annual cost of operation is $384, while the natural gas water heater costs only $215 per year, a 79% increase in the energy cost budget for the electric water heater. Using the respective source energy conversion factors of 3.16 and 1.1 in the IECC, the source energy consumption of the electric water heater is 42.3 MBtu while the source energy consumption for the gas water heater is only 22.6 MBtu, an 87% increase in the source energy budget for the electric water heater. RE166-13 considers them equal for compliance purposes because it uses a separate, biased reference home for determining compliance for electric water heating systems. The lower energy cost and source energy represent benefits to consumers and society, yet they are not rewarded in the RE166-13 methodology. It is this "best efforts" harmful bias that the proposed shift to a single baseline system methodology fully corrects.

There is another development in 2013 that corroborates this amendment and a shift to an equitable single baseline methodology for consistency. ASHRAE Standard 90.1-2013 (a deemed-to-comply option in IECC-2014) will include for the first time a new single baseline system methodology in the performance path for all new commercial buildings. This methodology is identical to the single baseline mechanical system methodology proposed in RE179. The 90.1 single baseline tables are more sophisticated than those in RE179 to accommodate the wide variety of building types and regional building practices in the commercial sector. By including the proposed methodology in the residential provisions of the 2014 IECC, the residential and commercial provisions will be internally consistent.

Public Comment 6:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Disapproval

Commenter's Reason: We recommend disapproval of RE166. In RE166, NAHB proposes to reintroduce an enormous loophole into the IECC residential energy provisions by re-creating the opportunity to trade-off the efficiency of other elements of the building for heating, cooling, and water heating equipment that is better than the least efficient equipment permitted to be sold under federal law. The net result would be that the same, fairly efficient equipment now typically installed in new homes due to technology advances, market conditions, and consumer preferences would result in zero energy savings – because the energy savings from efficient equipment would disappear through the a leakier thermal envelope and other efficiency downgrades allowed by the proposed trade-offs. **Reinstating the equipment trade-off loophole would be the single biggest step backward in energy efficiency proposed by any proponent in this cycle and should be rejected.**

Here is a summary of some of the many major problems with this NAHB proposal:

- The proposed trade-off would allow a massive reduction in the more permanent features of the building that affect energy efficiency (such as insulation, windows, building tightness and duct tightness) if reasonably efficient heating, cooling and hot water equipment is installed. Exchanging a weaker permanent envelope for much shorter-life equipment, which is likely to be installed anyway, is not reasonable. For example, a water heater with less than a 10 year life should not be used to reduce the amount of insulation or to trade-off for a leaky building – creating problems that will last for the life of the home.
- **Depending on the efficiency of the equipment installed and the climate zone, allowing equipment trade-offs could amount to up to 20% (or more) potential reduction from the requirements of the current code nationwide in any home where the equipment is above the federal minimum standard.** Such a trade-off could be used to wipe out most of the specific efficiency improvements included in the 2009 and 2012 IECC.
- The proponent does not offer good reasons for the IECC to reverse course and retreat on the issue of equipment trade-offs. Equipment trade-offs were removed from the IECC two code cycles ago; no trade-offs are permitted by the 2009 or 2012 IECC. Nothing significant has changed to justify going backward. In both of the previous code cycles, a majority of the IECC development committee and an overwhelming majority of the ICC's governmental members voted to remove these trade-offs and then later, to keep them out of the IECC. Earlier this year, on a close 6 to 5 vote, the IECC residential energy committee, with 4 NAHB representatives out of 11 voters, recommended this NAHB proposal for approval.
- The federal government has reviewed and approved for state and local adoption both the 2009 IECC and 2012 IECC, finding that the removal of the trade-offs improved the energy efficiency of the code. Since these equipment trade-offs are not allowed by the 2009 IECC, state or local adoption of the 2015 IECC with this added provision would appear to violate commitments made by the states, as a condition of receiving federal funding, to adopt the 2009 IECC and achieve 90% compliance.
- Reinstating the trade-off will not help encourage code adoption, as some claim. **Equipment trade-off provisions have been removed from the current code adopted in 2/3 of the states and numerous localities. As a result, numerous homes have been built nationwide without any discernible problems from elimination of the trade-off. Reinstating this trade-off would only serve to move all of these codes sharply backward.** While the committee's reason suggests that trade-offs are being

adopted locally on a widespread basis, no one has offered any evidence to substantiate that claim; the fact that 2/3 of states have adopted the 2009 or 2012 IECC without such trade-offs show that this claim has no basis in reality. In fact, we expect that reinstating the trade-offs would have the opposite effect -- many of the energy code supporters who currently support energy code updates would likely become strong opponents of adoption of a weakened 2015 IECC with such a trade-off.

- On a technical basis, equipment trade-offs are fundamentally a problem because, unlike other features (such as the building envelope), state and local codes are prohibited by federal law from setting a reasonable performance baseline for such equipment. Because the federal government has sole authority to set standards for such mechanical equipment, it is appropriate that the IECC leave this issue to the federal government. Reintroducing trade-offs would move the IECC back into this area of primary federal jurisdiction:

o For the code to establish a standard or baseline for federally-regulated equipment, it can only use federal minimum standards.

o Federal minimum standards for each type of equipment have been set at different times, under different circumstances, and under a different process than model or state codes, and subject to various regulatory, legal and political constraints – including long lead times to introduce a new level and a requirement that the same level of efficiency apply to equipment in new construction and to replacement equipment for existing homes, where it is often more difficult and costly to accommodate the latest technology.

o These federal minimum standards do not represent reasonable code baselines for efficient equipment comparable to baselines set in the code for other parts of the building.

o Federal minimum standards establish the minimum level at which equipment can be purchased for any purpose nationwide and are far too inefficient as compared with current building practice, creating a major compliance loophole that allows builders to reduce efficiency in other parts of the building.

o We are aware of no other baseline building feature in the energy code that can be traded-off that is set at the minimum level allowed to be sold under federal law.

o Allowing equipment trade-offs based on federal minimums introduces a significant fuel bias, currently in favor of natural gas, because the gap between the federal minimum standard and the typical efficiency level determined by the market is currently much wider for gas equipment than electric equipment. This is well illustrated by the fact that in 2015 gas furnaces will have an artificially low 80 AFUE standard nationwide as compared to the more rigorous 8.2 HSPF standard for electric heat pumps. As a result, homebuilders with an equipment trade-off can find far more trade-off potential by choosing gas equipment. Even the federal government has recognized that 80 AFUE for gas furnaces is far too low and has unsuccessfully attempted to increase it.

- While supporters of this proposal attempt to justify it in the name of "flexibility," this is just a euphemism for "loophole." It is a loophole because the typical equipment being sold and installed is already far more efficient than the minimum standard. **For example, if RE166 were approved, a builder could capitalize on the 90+ AFUE furnace they are likely already installing, and increase heating energy consumption by 10% to 15% (and energy costs paid by the homebuyer) by applying trade-offs to reduce thermal efficiency of the envelope.** We estimate the total impact on code-covered energy uses from a trade-off for a 90+ AFUE furnace to range from 6% to 9% lost energy cost savings nationwide, depending on the choice between 90 AFUE and 96 AFUE, and up to 14% lost savings in the coldest climate zones.
- As discussed in more detail below, a majority of gas furnaces sold in the US are 90+ AFUE. In states with colder climates, where the trade-off created by the efficient furnace is much greater, the number is far higher. On top of the furnace trade-off, the builder can also install a better hot water heater (with a relatively short operating life) for another, possibly even larger trade-off that further weakens the building envelope.
- The proponent also argues that trade-offs are necessary to avoid discouraging efficient equipment. Yet there is no evidence that builders need the trade-off to encourage better equipment. High-efficiency equipment continues to improve and penetrate the market even though trade-offs are currently not allowed in most states. Moreover, in many jurisdictions, the builder or homebuyer qualifies for utility incentives for such equipment. Utility incentives for equipment in new homes are likely to go away if trade-offs are reinstituted, since utilities typically are not permitted by their regulators to subsidize free ridership. Elimination of utility incentives will undercut, instead of support, the installation of efficient equipment.
- Similarly, the argument that equipment trade-offs are "energy neutral" touts a false equivalence by focusing on energy use on Day One and ignoring the use of energy over time. Replacing more permanent features with less permanent features is not energy neutral over time. Moreover, such an argument ignores the fact already noted above that the code is required to use minimum federal standards and cannot set reasonable levels of efficiency.
- Use of more efficient equipment in lieu of other energy efficiency measures also creates numerous other problems. For example, trading off envelope features for equipment also results in:
    - o Less comfortable homes due to weaker building envelopes and the likelihood to use more energy by adjusting the thermostat to compensate;
    - o Homes that are less resilient in the face of emergencies like hurricanes and snowstorms, where power or gas supply is no longer available and the homeowner is reliant on the building thermal envelope, not the equipment, to provide a habitable environment (the weaker the envelope, the greater the risk to the health and safety of the occupant); and
    - o Higher equipment loads and peak demands, with added first-cost for more heating or cooling capacity and negative impacts on utility generation, transmission and distribution systems.
- Reinstituting equipment trade-offs will create a bias for the performance path and lead to a migration away from compliance through the simple prescriptive path; greater utilization of the much more complex performance path will substantially complicate code compliance and enforcement.

Many of these issues are discussed in more detail below. We call on the Governmental Members to vote to retain a reasonable energy code by rejecting NAHB's efforts to take the code back to 2006.

1. Equipment trade-offs will create a huge energy efficiency loss for the nation and are not "energy neutral."

Although states can set performance baseline requirements for efficiency for most building components, certain types of mechanical equipment, including heating, cooling, and water heating equipment, are subject to a rigid set of requirements under Federal law. If any state incorporates equipment into a performance equation, it is mandated under federal law to base any trade-off on federal minimum efficiencies, which are well below the typical efficiency of equipment installed in many cases. (This law was designed to preclude states from indirectly requiring the use of more efficient equipment than the federal minimum standard requires.) Using gas furnaces as an example, even if builders routinely install condensing natural gas furnaces with 90+% efficiency, the state is prohibited under federal law from requiring 90+% efficient furnaces or anything more efficient than the federal minimum – generally an 80% efficient gas furnace. This creates an enormous (greater than 10%) loophole between the baseline amount of heating energy used and the actual amount used by the equipment, allowing a substantial degrading of the efficiency of other measures when using the performance path.

When the IECC permitted an equipment trade-off in the past (pre-2009 IECC), this federal preemption of state equipment requirements created a trade-off gap that was routinely exploited to reduce the efficiency of other elements of the building. According to an analysis produced by ICF International modeling the effects of this proposal, the impact on building energy efficiency if this trade-off were permitted again would be substantial. In the following table, 5 different trade-off packages illustrate the magnitude of the resulting trade-off loophole that will reduce the long-term energy efficiency of the building.

	2015 Federal Minimum Equipment Efficiency	Readily Available Equipment Efficiency	National Average Increase in Energy Use
Example 1 - Natural Gas (90 AFUE Only)			
Natural Gas Furnace	80 AFUE	90 AFUE	6%
Air Conditioner	13 SEER/14 SEER	13 SEER/14 SEER	0%
Water Heater	0.59 Gas DHW	0.59 Gas DHW	0%
		National Average	6%
		Climate Zone Averages	0-9%

	2015 Federal Minimum Equipment Efficiency	Readily Available Equipment Efficiency	National Average Increase in Energy Use
Example 2 - Natural Gas (Moderate Efficiency Equipment)			
Natural Gas Furnace	80 AFUE	92 AFUE	7%
Air Conditioner	13 SEER/14 SEER	16 SEER	2%
Water Heater	0.59 Gas DHW	0.67 Gas DHW	3%
		National Average	12%
		Climate Zone Averages	9-13%

	2015 Federal Minimum Equipment Efficiency	Readily Available Equipment Efficiency	National Average Increase in Energy Use
Example 3 - Natural Gas (High Efficiency Equipment)			
Natural Gas Furnace	80 AFUE	96 AFUE	9%
Air Conditioner	13 SEER/14 SEER	19 SEER	4%
Water Heater	0.59 Gas DHW	0.80 Gas DHW	9%
		National Average	22%
		Climate Zone Averages	18-30%

	2015 Federal Minimum Equipment Efficiency	Readily Available Equipment Efficiency	National Average Increase in Energy Use

Example 4 - Electric (Moderate Efficiency Equipment)			
Heat Pump	8.2 HSPF	8.5 HSPF	1%
Air Conditioner	14 SEER	16 SEER	2%
Water Heater	0.92 Elec DHW	0.95 Elec DHW	2%
		National Average	5%
		Climate Zone Averages	3-10%

	2015 Federal Minimum Equipment Efficiency	Readily Available Equipment Efficiency	National Average Increase in Energy Use
Example 5 - Electric (High Efficiency Equipment)			
Heat Pump	8.2 HSPF	9.2 HSPF	3%
Air Conditioner	14 SEER	19 SEER	4%
Water Heater	0.92 Elec DHW	1.15 Elec DHW	13%
		National Average	21%
		Climate Zone Averages	13-29%

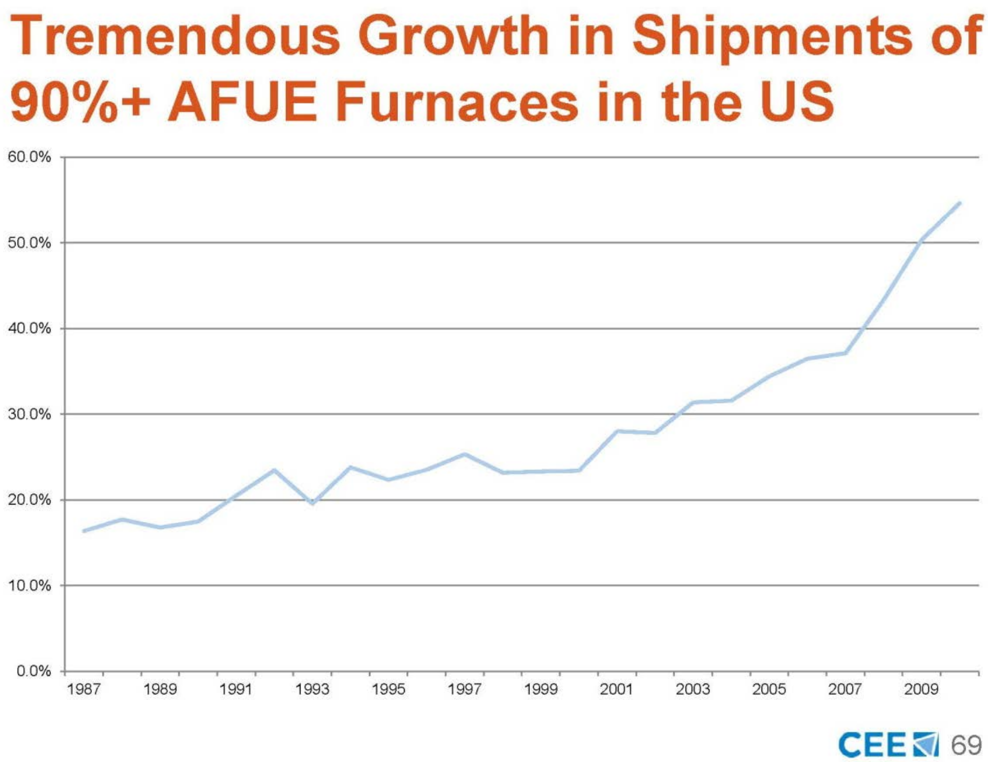
The national average percentage numbers in the tables indicate the amount of energy savings at risk if a builder uses readily available mechanical equipment as a means of “trading off” elements of the thermal building envelope such as insulation or windows. Thus, if RE166 is successful, and equipment trade-offs are included in the IECC for heating, cooling, and water heating equipment available to be installed in homes in 2015, new homes would be built to a substantially less efficient standard.

As an example, in Climate Zone 3, further analysis conducted by ICF International shows that homes that use high efficiency heating, cooling and water heating equipment can trade-off **ALL** of the following measures: wall insulation from R-20 to R-11, infiltration from 3 ACH50 to 7 ACH50, window U-factor from 0.35 to 0.75, window SHGC from 0.25 to 0.50, and duct leakage from 4 CFM/100 SF to 10 CFM/100 SF. Even if the high-efficiency equipment were not being installed in any case, the proposed trade-off, claimed to be energy cost neutral in the first year, would result in larger equipment sizes (63% larger furnace and 80% larger air conditioner), higher peak demand (22% increase) and significant comfort reduction due to having a leakier home, with leakier ducts and more extreme temperature at the exterior surfaces of the home. The larger equipment sizes will increase the cost of future equipment purchases, the higher peak demand will continue to stress the electric grid and the comfort reduction will cause higher energy bills, occupant turnover and lower property values.

To restore the equipment trade-offs in the IECC amounts to an unnecessary and costly giveaway and a massive backslide in energy efficiency.

2. **Energy efficient equipment will be installed even without a trade-off, so this provision represents an enormous loophole for builders and results in increased energy use, less comfort, and higher operating costs for all subsequent owners of the home.**

As can be seen in the chart below from the Consortium for Energy Efficiency (CEE) with data from AHRI, there has been a steady growth in the number of 90%+ AFUE furnaces across the entire US. In addition to this long term trend, recent data from US EPA show that in 2011, 55% of the furnaces shipped in the US were 90%+ AFUE ENERGY STAR furnaces. At the local level, in more northern heating climates where the 90+ furnace will create the greatest trade-off opportunity, the number is obviously much higher. For example, the Energy Center of Wisconsin shows that 90% of all furnaces in Wisconsin are 90%+ AFUE as of the 4th quarter of 2011. The potential for abuse of the furnace trade-off alone is staggering.



Source: AHRI

3. **Short-term "flexibility" should not come at the expense of permanent energy efficiency.**

Despite the widespread adoption of the IECC with no equipment trade-offs for the last four years and the major problems with such trade-offs, some still argue that an equipment trade-off adds necessary "flexibility," and that without these trade-offs, codes will not be adopted and buildings will not be constructed with efficient equipment. This argument ignores three important realities: (1) efficient buildings should have both an efficient thermal envelope AND efficient equipment; (2) efficient equipment, because of consumer demand, utility incentives, and market maturity, is already widely used even without code trade-offs; and (3) about two-thirds of the states have already adopted the IECC without any such trade-offs.

Allowing direct trade-offs for building mechanical equipment, typically with much shorter life spans than the structure itself, ignores the long-term value of the permanent thermal envelope. Well-insulated homes provide a cost savings stream for homeowners for a much longer period than HVAC equipment, which will have to be replaced several times over the lifetime of the home. While the IECC performance path analysis and other similar measures calculate the energy use or energy cost over a one year period, this is only a limited snapshot of the home's lifetime. A true analysis of the impact on the eventual homeowner must consider the impact of various measures over the life of the home.

A good illustration of the long-term energy impact of equipment trade-offs is to assume two homes: the first built to the 2012 IECC with minimum federal equipment, and the second built using equipment trade-offs to reduce the thermal envelope of the IECC. It should be noted that this illustration only addresses the long-term impact and not the free-rider issue -- that many homes will have upgraded equipment already. In the first year, the two homes may use the same amount of energy (assuming the equipment performs per spec). However, as heating, cooling, and/or water heating equipment is replaced every 5 to 20 years, it is reasonable to expect that improved efficiencies will result in the equipment in both homes becoming the same over time – through a combination of updated federal standards and ongoing technology improvements and market forces – or at least that the less efficient equipment in the first home will improve more rapidly than the more efficient equipment in the second home (it is also possible that the home with the more efficient equipment will replace that equipment with less efficient units). As this transition happens, **the 2012 IECC house will always outperform the trade-off house, because it will benefit both from the stronger thermal envelope *and* more efficient equipment** once replacement occurs. In addition, the home relying upon more efficient equipment will also need to size the equipment larger, will generate higher peak loads and the homeowner will have a home that will not respond as well during emergencies where electricity or gas is unavailable.

4. **The ICC should continue to stand behind its decisions over the past two code cycles to eliminate and keep equipment trade-offs out of the residential energy code.**

To restore equipment trade-offs in the 2015 IECC would not only be a significant setback in energy efficiency for states adopting that code, but such a reversal of position would also undercut the credibility of the IECC. Despite efforts of some stakeholders at the state level, the vast majority of states do not currently allow trade-offs of equipment efficiency for thermal envelope efficiency. The states have followed the lead set by both the 2009 and 2012 versions of the IECC – that such trade-offs are unnecessary and no longer appropriate. Currently, at least 33 states have adopted either the 2009 or 2012 IECC without any equipment trade-offs (in other states, where the code is adopted by local government, in many cases the new codes have also been adopted without trade-offs).

Congress also endorsed the 2009 IECC by reference in federal law -- the 2009 American Recovery and Reinvestment Act (ARRA) – setting the 2009 IECC as the starting point for state code adoption and implementation. All fifty states committed to adopt a residential code that meets or exceeds the 2009 IECC (which does not contain an equipment trade-off) under ARRA, and received over $5 billion in DOE State Energy Program grants in return. Adoption of equipment trade-offs would be inconsistent with this law and these commitments.

The U.S. Department of Energy explained some of the benefits of eliminating the equipment trade-off in its analysis of the 2009 IECC, when it found that the 2009 IECC version was an improvement over the 2006 version and found that the elimination of the trade-offs would likely result in energy savings in the home:

> Because building envelopes have substantially longer lives than HVAC and/or water heating equipment, energy savings from envelope improvements may persist for many more years than comparable equipment improvements. Also, because high-efficiency equipment is already the predominant choice in many markets, disallowing envelope/equipment tradeoffs is likely to result in improved overall efficiency in many situations.

See 75 Fed. Reg. 54131, 54138 (Sept 3, 2010).

A well-insulated thermal building envelope will yield substantial cost-savings benefits to a homeowner for the lifetime of the home, and the IECC should not trade away these long-term benefits for short-term savings associated with HVAC trade-offs. Such an amendment could roll back the energy code requirements currently enforced in most states, and could negatively impact the nation's energy conservation efforts for generations to come. We urge disapproval of RE166 and all other similar equipment trade-off proposals.

RE166-13

Final Action: AS AM AMPC____ D

RE169-13
Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Gary MacFadden, National Electrical Manufacturers Association (NEMA) (gary.macfadden@Nema.org)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems[f, g]	As proposed for other than electric heating without a heat pump. Where the proposed design utilizes ducted electric heating without a heat pump, the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC—Commercial Provisions. Where the proposed design is for an electric heating system that does not use a duct system, the standard reference design shall be as proposed. Capacity: sized in accordance with Section R403.6	As proposed

(Portions of table not shown remain unchanged)

Reason: As it is written, Table R405.5.2(1) requires a modeler to assume a heat pump system whenever a designer proposes to use "… other than electric heating without a heat pump," *i.e.*, electric resistance or electric radiant heating (collectively "ERH") in a new residence. While perhaps serving a valuable function in some fashion (elimination of gaming where a modeler assumes an electric furnace for the reference house and then proposes a heat pump allowing a less stringent envelope), the limitation on use of ERH in the modeling is overly restrictive. ERH is available in many different applications and the performance characteristics of non-ducted ERH are very different from the performance characteristics of ducted heating systems, whether fueled by electricity, gas, or any other fuel. In addition to no duct energy losses, non-ducted ERH also enjoys significant energy savings from zoning. This proposal attempts to preserve the benefit of eliminating gaming while still recognizing the energy savings potential of non-ducted ERH.

Substantiation: ERH is available in a number of different configurations, including electric furnace, baseboard, radiant and PTAC. For purposes of this proposal, however, only non-ducted ERH is being considered. The operational and energy consumption characteristics of ducted vs. non-ducted ERH are significant and are at the core of the rationale behind this code change proposal. Unfortunately, ducted and non-ducted ERH systems are often grouped together (as they are in the existing code language).

Language like that found currently in Table R405.5.2(1) that requires a modeler to assume a heat pump in the reference house, even if the designer intends to use electric baseboard heating in the proposed house, has been in the IECC for many years. The justification cited historically for that modeling limitation is:

- That modelers will game the system by assuming ERH in the reference house but a heat pump in the proposed house, thereby allowing a less stringent envelope, and/or
- That a heat pump will consume on the order of half the energy of an electric furnace installed in the same house so the code should discourage designers from specifying ERH and instead should specify a heat pump.

With respect to the former of these justifications, the current language requiring the same equipment to be modeled in both the reference and the proposed designs denies any opportunity to game the system as described above.

That leaves the latter as the sole justification for the modeling restriction against using electric resistance heating as the equipment assumption in the reference house. To some extent, this seems appropriate. If, for instance, in a heating dominated climate, a designer is proposing to install a ducted electric furnace with central air-conditioning, then incenting that designer to use a heat pump instead would probably be expected to save significant amounts of energy at a relatively modest cost.

But there are significant operational and energy consumption characteristics that distinguish ***ducted from non-ducted*** ERH as described in more detail below.

Ducted vs. non-ducted heating systems. Non-ducted ERH has significantly different operational and energy consumption characteristics from ducted heating systems.

Fan Power. Numerous studies over the last decade have identified furnace fan energy usage as more significant than before believed. As a result, the U.S. Department of Energy has initiated a rulemaking to establish a test procedure for determining furnace fan energy. Likewise, the Environmental Protection Agency now has an Energy Star rating for efficient furnace fans. Of course, non-ducted ERH like baseboard or radiant doesn't use a fan. On this basis, a reasonable person could conclude that, all other things being held constant, a non-ducted ERH system (without a fan) would consume less energy than a ducted electric furnace with a fan.

Duct loss and fan induced infiltration. Energy losses through ductwork are recognized as significant and come from two distinct sources; air lost through ductwork to the outside and induced infiltration/exfiltration caused by duct pressurization. Air lost to the outside is self-explanatory and is, in fact, already recognized by the 2012 IECC (and earlier versions) in Table R405.5.2(2) where distribution system efficiency is discounted under certain common conditions. In addition, there is growing recognition that ductwork design can have a significant impact on infiltration/exfiltration. On this basis, a reasonable person could conclude that, all other things being held constant, a non-ducted ERH system would consume less energy than a ducted electric furnace.

Zoning. Ducted, central heating, whether it be a ducted heat pump, electric furnace, gas furnace or other, is designed to serve large areas, most often an entire house. Non-ducted ERH, on the other hand, generally divides a house up into numerous independently controlled zones. The energy efficiency benefits of zoning are well documented as it allows users to heat only those areas that are occupied resulting in significant savings. On this basis, a reasonable person could conclude that, all other things being held constant, a zoned, non-ducted ERH system would consume less energy than a ducted electric furnace.

Additional considerations. Few people would argue that, at the margin, a zoned, non-ducted ERH would be expected to consume fewer btu's over the course of a winter than a ducted electric furnace. In addition to these operational differences, however, (no fan energy, no duct losses, benefits of zoning), there are other reasons why ERH should be treated differently from ducted heating systems as noted below.

Cooling. There are still a non-trivial amount of new homes built in the United States every year without central cooling. According to the EIA, over 800,000 new homes were built between 2000 and 2009 without air-conditioning. A recent study in the Pacific Northwest revealed a relationship between increased use of cooling energy in homes that use heat pumps vis-à-vis electric furnaces. While there are a number of potential explanations, at least one explanation is that people using ERH consciously decline to install air conditioning. Thus, incenting the use of heat pumps over ERH may have the unintended result of increasing summer cooling energy.

Cooling dominated climate. In cooling dominated climates, with relatively few heating degree days (DOE Climate Zones 1 & 2), driving a builder to use a heat pump which would save relatively little – if any – heating energy due to the warm climate would result in fewer dollars for that builder to spend on other things like more attic insulation or higher SEER air-conditioning – something that would actually result in energy savings.

Non-ducted ERH has significantly different operating characteristics than ducted heating systems.

With respect to the assumption that a heat pump system will consume less than half the btus's of an electric resistance heating system because the heat pump has a COP of 2 or better, this assumption may be valid for a comparison between a ducted heat pump and a ducted electric resistance furnace, but it not accurate for non-ducted, zoned ERH (*See* Note 1 below)

In a study conducted by the National Association of Home Builders Research Center for the U.S. Department of Energy, an occupied house in the Washington, D.C. area was monitored for performance over a winter. The house contained three distinct heating systems; central electric heat pump, electric radiant heat, and electric baseboard heat. After the data was weather normalized, it revealed that, under actual homeowner controlled conditions, the electric radiant system used 33% percent less energy than the heat pump system and 52% less than the electric baseboard system. Thus, the heat pump only saved about 36% the energy consumed by the electric baseboard system.

Heat pumps are a great option when a person wants a central, ducted hearing and cooling system but they having different operating characteristics from a non-ducted ERH system.

Note 1. Recent field data from a large survey of homes suggests that the actual (vs. theoretical) relationship may not be as well understood as previously believed. *See* study at http://www.nwcouncil.org/energy/rtf/meetings/2009/04/Draft%202008%20NEEM%20Study_040608.pdf (p. 21) where observed heat pump energy savings were far short of expectations and the report said

> "For the heat pump cases, however, the apparent similarity between electric resistance and heat pump systems suggest minimal savings for the more efficient heat pump option. Some form of behavioral ―takeback‖, poor heat pump installations or increased summer cooling load for heat pumps vis-à-vis resistance houses seem the likeliest explanations. Given that a number of the zone 1 sites (e.g.: Medford, Oregon; Yakima, Washington; and The Dalles, Oregon), have cooling climates, the latter seems plausible. A possible alternate contributing explanation is that these heat pump units do not in fact achieve an average COP of as much as 2 under actual operating conditions. Field notes from heat pump cases in the Oregon sample (a high percentage of heat pumps) mentioned occupants who complained about a lack of comfort to their heating contractor and were told by their heating contractors to switch the heat pumps to run in electric resistance heating mode."

Bibliography

Study of manufactured housing in the Pacific Northwest,
http://www.nwcouncil.org/energy/rtf/meetings/2009/04/Draft%202008%20NEEM%20Study_040608.pdf

NAHB Radiant Heat Study, http://www.toolbase.org/PDF/CaseStudies/enerjoy_case_study.pdf

For an Alliance to Save Energy video on the benefits of zoning *see* http://www.energynow.com/video/2011/11/16/home-efficiency-tips-heating-and-cooling-zones where the moderator quotes the Department of Energy as saying that zoning can save up to 30% on home heating and cooling bills.

For information on duct leakage *see* http://www.greenbuildingadvisor.com/blogs/dept/musings/duct-leakage-testing. Also *see* EPA Energy Star guidance at http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts.

For information on fan induced infiltration into buildings *see* http://www.buildingscience.com/documents/digests/bsd-014-air-flow-control-in-buildings/files/bsd-014_air-flow-control_ed.pdf.

For an article on the significance of furnace fan energy *see* http://aceee.org/proceedings-paper/ss08/panel02/paper09. Also *see* U.S. Department of Energy Appliance Efficiency furnace fan docket at http://www1.eere.energy.gov/buildings/appliance_standards/residential/furnace_fans.html.

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

R405.5.2(1)T #2-EC-MCFADDEN.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This proposal would have the effect of possibly doubling the heating use of the house by allowing the energy budget to be higher.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary MacFadden, The National Electrical Manufacturers Association, representing NEMA, requests Approval as Submitted.

Commenter's Reason: Table 405.5.2(1) establishes criteria for calculating energy budgets for persons that would like to use the IECC's performance path to demonstrate code compliance. As part of that process the Table sets out minimum requirements for the modeling of equipment. For all equipment except electric resistance heating, the space heating equipment that is modeled in the reference house must be identical to equipment modeled in the proposed house.

With electric resistance heating, however, the Table requires the modeling of a heat pump for all homes using electricity to heat – even if the owner plans to use zoned electric resistance heat for space heating.

In our original support of RE169 we provided voluminous documentation of the many differences between *non-ducted* electric resistance heating (like zoned baseboard and radiant panels) and the operation of a heat pump.

Without repeating those citations, we would like to summarize as follows:

1. Electric baseboard has no duct losses,
2. Electric baseboard consumes no fan energy,
3. Electric baseboard causes no fan induced home infiltration or exfiltration,
4. Electric baseboard complements the growing production of electricity from renewable sources like wind and solar,
5. Unlike central heating systems, electric baseboard enjoys room-by-room zoning allowing efficient operation.

Electric baseboard heating is not the best choice in all applications --- but it is the right choice in many instances. For example, over 1,000,000 homes have been built over the last 10 years that do not use air conditioning!! Incenting people that don't want air conditioning to use a heat pump is not a good policy given growing concerns over summer peak power demands. In another example, the Founder of the Passive House Institute chose to heat her new house with electric baseboard.

This proposal would simply match modeling of electric baseboard heating to those circumstances where a person elects not to use ducted central heating *and* they don't want air conditioning.

RE169-13

Final Action: AS AM AMPC____ D

RE170-13
Table R405.5.2(1) (IRC Table N1103.5.2(1))

Proposed Change as Submitted

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org), and Mark Halverson, APA-The Engineered Wood Association & Loren Ross, The American Wood Council. (help@apawood.org).

Note: *RE177 was listed in the code change monograph separately with Mark Halverson as the proponent. Since RE177 was a duplicate of RE170, RE177 was withdrawn, and Mark Halverson is listed as a co-proponent on this code change proposal.*

Revise as follows:

TABLE R405.5.2(1) (N1103.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing[a]	Total area[b] =	As proposed
	~~(a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area.~~	
	~~(b)~~ 15% of the conditioned floor area~~; where the proposed glazing area is 15% or more of the conditioned floor area.~~	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S, & W)	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	0.92-(0.21 × SHGC as proposed)
	Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design)	As proposed
	External shading: none	

(Portions of table not shown remain unchanged)

Reason: (Surrena) Walls generally perform better thermally than windows. Currently in the code there is no incentive in the performance path for the building designer to optimize the window area in order to save energy and provide daylighting, egress and views that makes for a safe and comfortable house. These modifications will provide the building designer the ability to reduce window area and get credit for the energy saved. As this section is currently written, the house is penalized for having more than 15% window area yet receives no credit toward code compliance when the window area is reduced below 15%. This change rectifies this disparity and makes the performance path a more representative of actual energy use.

(Halversen) The greatest thermal break in our wall systems is glazing. While glazing areas greater than 15% of the floor area are penalized for reduced energy efficiency, glazing areas less than 15% are not recognized for increasing energy efficiency. Homes with a lower percentage of windows and doors generally perform better than the code minimum (15%); therefore, these homes should get credit for the additional energy efficiency. This will enhance the readability of the code while making it easier to understand, more equitable, and provide flexibility to builders and architects.

Every avenue must be explored when elevating energy code efficiency to the next level, and this offers an efficiency increase that has not yet been recognized in the code.

We ask the support of the committee for this proposal.

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

R405.5.2(1)T #2-EC-SURRENA.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This proposal would penalize small dwellings where the percentage of openings must necessarily be larger than 15%, and they cannot take advantage of the tradeoff. This also has the effect of increasing the energy budget by lowering the amount of loss in the standard referenced design. RE164-13 is the better approach for this issue.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Don Surrena, National Association of Home Builders, and Tim Ryan, representing the International Association of Building Officials, request Approval as Submitted.

Commenter's Reason: Building walls generally perform much better thermally than windows. This code change proposal will provide the building designer the option to reduce window area and get the appropriate energy credits for the amount of energy saved. As this section is currently written, the home designer is penalized for having more than 15% window area, but receives no energy credits toward code compliance when the window area is reduced below 15%. This code change proposal fixes this disparity and makes the performance path ~~a~~ more representative of actual energy use.

Public Comment 2:

Paul Coats and Mark Halverson, representing APA-The Engineered Wood Association/American Wood Council request Approval as Submitted.

Commenter's Reason: Assuming that the energy code is being developed to save energy, it seems obvious that decreasing the area of windows (which are typically only an R3 or less) in a wall system and increasing the opaque wall areas (R13, R20 and R20+5) should be recognized as an energy-saving measure in the code. Regardless of the climate zone, window and door areas do not have the thermal resistance of opaque walls. It is even difficult to advocate the advantages of passive heat gains during the colder weather months given the fact that SHGC values have no minimum limitations in any of the climate zones. The International Energy Conservation Code must recognize that buildings with fewer windows save energy and incentivize the use of fewer windows.

The committee commented during the hearings that they feared that the builders would somehow "game the system" by using the energy credit for less windows to off-set energy efficiency in other areas of the structure. However, the trading-off of the energy efficiencies of the building components and systems is the basis of performance paths. To hinder the builders' and designers' abilities to meet energy efficiency in any way that they choose creates inequities in the code that lead to preferential treatment of some products and systems and limitations to market access for other products and systems.

The committee's reason statement endorsed the approach of RE 164-13 which removes all area restrictions for windows and doors in the performance path. This position, along with denying energy savings from reduced window area, indicates that the committee thinks that the area of windows is not related to energy savings. Apparently, the committee accepted the proponent's reason statement in RE 164-13 to "keep it simple and keep it energy efficient." Simplicity is good, but the impact on energy efficiency is not acceptable. The proponent of RE164-13 claimed that "as windows get more efficient, the window area matters less" and that windows in the market in colder climates "may be as good as a 'normal' wall". In reality, the thermal performance of code-conforming windows is not comparable to opaque walls. In the 2006 IECC windows ranged in U-factors from U-1.2 to U-0.35 and in the 2012 code windows ranged from U-NR to U-0.32. In contrast, U-factors for walls range from 0.082 to 0.048. In the 2012 IECC, walls are typically 6 times more energy efficient than windows. The least insulated walls (Climate Zone 1) are 4 times more efficient than the windows required in the coldest climate zone (Climate Zone 8). There is no indication that window U-factors will approach the U-factors of opaque walls in the near term. It is absurd to remove the weakest link in heat resistance from consideration in the performance path.

While continuous insulation advocates continue to be concerned about the "thermal break" of wood wall framing materials, the even greater thermal break of windows and doors will now be unrestricted in area. The thermal resistances through the wood framing path in an opaque wall are calculated as R6.8 for 2x4 walls and R9.3 for 2x6 walls, while window values hover around an R3 level or less. It would appear that the code is moving in a direction that is neither product neutral nor encouraging energy efficiency.

We urge the body's support of this code change proposal that is product neutral and saves energy.

RE170-13

Final Action: AS AM AMPC____ D

RE171-13
Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proposed Change as Submitted

Proponent: Jeremiah Williams / U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing[a]	Total area (exclusive of glazing of thermally isolated sunrooms)[b] = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area. Orientation: equally distributed to four cardinal compass orientations (N, E, S & W). *U*-factor: from Table R402.1.3 SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design) External shading: none	As proposed As proposed As proposed As proposed 0.92-(0.21 × SHGC as proposed) As proposed
Thermally isolated sunrooms	~~None~~ Geometry and orientation: same as proposed Opaque ceiling and wall insulation: in accordance with Section R402.2.12 Opaque wall solar absorptance = 0.75 Opaque wall emittance = 0.90 Fenestration U-factor: in accordance with Section R402.3.5	As proposed As proposed As proposed As proposed As proposed

(Portions of table not shown remain unchanged)

Reason: In the current code, there is no connection between the performance path and the prescriptive requirements for thermally isolated sunrooms. Including thermally isolated sunrooms in the standard reference design, if present in the proposed design, ensures a proper comparison against the code's associated prescriptive requirements and minimizes confusion about the applicability of the sunroom specifications for homes complying via the performance path.

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

R405.5.2(1) #3-EC-WILLIAMS.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This proposed change would represent a significant increase in the energy budget for the standard referenced design.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremiah Williams, U.S. Department of Energy requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Glazing[a]	Total area (exclusive of glazing of thermally isolated sunrooms)[b] = …	As proposed …
Thermally isolated sunrooms	Geometry, area, and orientation of fenestration, opaque wall, opaque ceiling/roof, and floor/foundation area: same as proposed Opaque ceiling and wall insulation: in accordance with Section R402.2.12 Opaque wall solar absorptance = 0.75 Opaque wall emittance = 0.90 Fenestration U-factor: in accordance with Section R402.3.5 Fenestration SHGC:in accordance with Table R402.1.1	As proposed

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In the current code, there is no connection between the performance path and the prescriptive requirements for thermally isolated sunrooms. Including thermally isolated sunrooms in the standard reference design, if present in the proposed design, ensures a proper comparison against the code's associated prescriptive requirements and minimizes confusion about the applicability of the sunroom specifications for homes complying via the performance path.

This Public Comment addresses deficiencies raised at the Committee Action Hearing. SHGC was added to the modeling requirements. This proposal, as modified by this Public Comment, does not alter the stringency of the code, because the standard reference design is set to have the prescriptive requirements in section R402 of the code. This is consistent with the fundamental approach used to establish compliance via the performance path.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

RE171-13

Final Action: AS AM AMPC____ D

RE172-13

R405.1 (IRC N1105.1), Table R405.5.2(1) (IRC Table N1105.5.2(1)), R405.7 (NEW) (N1103.7 (NEW)), R405.8 (NEW) (N1103.8 (NEW)), R405.9 (NEW) (N1103.9 (NEW)), R405.10 (NEW) (N1103.10 (NEW))

Proposed Change as Submitted

Proponents: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com), Gerald Van Decker, RenewABILITY, representing self (gerald@renewability.com), Philip Fairey, Deputy Director, Florida Solar Energy Center (pfairey@fsec.ucf.edu)

Revise as follows:

R405.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. ~~Such analysis shall include heating, cooling, and service water heating energy only.~~

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN[m]
Internal gains	IGain = ~~17,900 + 23.8 x *CFA* + 4104 x N_{br}~~ 16,600 + 12 x *CFA* + 8080 x N_{br} (Btu/day per dwelling unit) N_{br}=Number of bedrooms	Same as standard reference design.
Service Water Heating [f,g,h,j,l,m]	~~As proposed~~ Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum standards Use: gal/day = 20 + (10 × N_{br}) Tank temperature: 120°F ~~Use: same as proposed design~~ N_{br}=Number of bedrooms	As proposed As proposed Use: Standard reference x SWHF ~~gal/day = 30 + (10 × N_{br})~~ Same as standard reference Design

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN[m]
Clothes washer [k, n]	550 kWh/yr	Either of the following: Same as standard reference design or (300 × IMEF), kWh
Lighting	300 + (0.43 x CFA), kWh/yr CFA = Conditioned floor area (ft^2)	Either of the following: Same as standard reference design and lighting is in compliance with Section R404.1 or 1 kWh/yr per watt of installed lighting
Refrigerator[n]	500 kWh / year	Either of the following: Same as standard reference design or As proposed

(Portions of table not shown remain unchanged)

j. SWHF = Service water heating factor. SWHF is the product of multiplying the hot water distribution efficiency factor and the drain water heat recovery factor.

Hot water distribution efficiency factor:

= 0.80
where a *demand recirculation water system* is installed for the hot water distribution system and the volume in the piping from the circulating hot water piping to the termination of the fixture supply for every fixture is less than or equal to 0.19 gallons (0.71 liters).

= 0.9
where the water volume in the piping from the water heater to the termination of the fixture supply for every fixture is less than or equal to 0.5 gallons (1.89 liters).

= 1.0
where the other conditions are not met.

Drain water heat recovery factor:

= (1 – (Drain water heat recovery unit efficiency x 0.36))
where one or more DWHR units receive the drain water from all showers in the building and the DHWR units are in accordance with Section R405.10.

= (1 – (Drain water heat recovery unit efficiency x 0.18))
where a DWHR unit receives the drain water from the primary shower but not all showers in the building and the DHWR unit is in accordance with Section R405.10.

= 1.0
where the other conditions are not met.

k. IMEF = integrated modified energy factor for the proposed clothes washer
l. Where more than one drain water heat recovery unit is used, the average efficiency of all drain water heater recovery units shall be used in the performance calculation.
m. Proposed design equipment and device efficiencies shall be in accordance with Section R405.7.
n. Where the proposed design includes more than one refrigerator or clothes washer, the energy use shall be summed.

Add new text as follows:

R405.7 (N1103.7) Equipment and device verification. The efficiency of the equipment and devices used for the proposed design shall be specified in the construction documents. The installed equipment and devices shall not be less than the efficiency specified in the construction documents. The efficiency of equipment and devices shall be indicated by the manufacturer on a label or on a specification sheet attached to the equipment or device. The equipment or device efficiency shall be readily observable for inspection after the equipment or device is installed. This section shall apply only to equipment and devices where the proposed design is different than the standard reference design for that equipment or device.

R405.8 (N1103.8) Hot water distribution verification. The construction documents for the building shall show plumbing diagrams that indicate water heaters, plumbing fixtures, plumbing appliances, pipe sizes and layouts for hot water supply and hot water circulating system piping. The layouts shall indicate the volume of water in the branches of the piping from the nearest source of hot water piping to the termination of the fixture supply pipe. This section shall apply only where the proposed design for the hot water distribution system is different than the standard reference design for the hot water distribution system.

R405.9 (N1103.9) Lighting verification. A schedule, by room, of lighting fixtures and lamps indicating the wattage of each fixture shall be provided for interior lighting and garage lighting. The sum of wattages on the schedule shall be used for the proposed design. This section shall apply only where the proposed design for lighting is different than the standard reference design for lighting.

R405.10 (N1103.10) Drain water heat recovery units. Drain water heat recovery units shall be tested by the manufacturer for efficiency and pressure loss at a flow rate of 2.5 gpm (9.5 L/m) through each water side flow path. The water side pressure loss shall not exceed 3 psi (20.7 kPa) for each flow path. The manufacturer shall indicate the efficiency and pressure loss of the unit on a label or specification sheet attached to the unit. This section shall apply only where the efficiency of drain water heat recovery is used in the performance calculation.

Reason: This code change proposal
-- expands the performance calculation to include options for energy savings from water heating, lighting, refrigerators and clothes washers.
-- updates water use, lighting and internal gains equations in the performance calculation table to reflect current equipment, and
-- specifies efficiency measures in a way that makes them enforceable.

The options in this proposal were picked because they have significant impact, can be specified in simple terms, and can be specified based on existing tests or standards. The performance section user can choose to use or not use any of these options. Options not used become neutral in the performance calculation, because the standard reference design and the proposed design become the same.

This proposed change includes four options for saving the energy used for service water heating:
-- efficient water heater,
-- efficient water heating distribution, also know as efficient hot water pipe layout,
-- recovery of heat from drain water, and
-- efficient clothes washer

The first hot water energy saving option is a water heater that exceeds the minimum Federal efficiency standard for water heaters. The efficient water heater is computed as it was in the 2006 IECC. Water heaters exceeding minimum Federal efficiency are widely available.

The second source of hot water savings is limiting the waste in delivering hot water to the point of water use. This does not limit hot water use, rather it limits hot water waste. Hot water must first flow through the pipes from the water heater to the point of use. Unless hot is water already in the pipes, the cool water in the pipes must be emptied and replaced by hot water, which wastes water. After use the hot water left in the pipes cools down, unless there is another use within about an hour. The cool down is wasted heat. Thus hot water distribution routinely wastes both energy and water. Piping layouts with less water volume between the water heater and water use inherently waste less heat and less water. The two "distribution efficiency factors" and their savings for limiting wasted hot water are adapted for the IECC from the ANSI consensus standard ICC 700-2012 (National Green Building Standard). The factors, 0.90 and 0.80, represent a 10% and 20% savings respectively. As an additional benefit, limiting hot water waste means better performance, because the hot-water-user's wait for the "cold water to get hot" is the time it takes to replace cool water in the pipes with hot water and smaller water volumes are replaced more quickly.

The third source of hot water energy savings is heat recovery from drain water. Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this "coincident flow" occurs in homes with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not have high pressure loss in order to minimize the impact on water pressure in the home. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. To put the "0.36" in the equation in perspective, the "coincident flow" in a residence is typically 50%-70% of the hot water use, so 0.36 (36%) times the device's efficiency is similar to saying the unit works well on showers and lavatories, and may also recover a portion of the rest of the hot water use in the home. The 0.36 also covers natural drain water heat loss and assumes the "worst-case" plumbing scenario for DWHR devices. This calculation of savings is conservative. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

The fourth source of water heating savings is clothes washers. Clothes washer efficiency is rated by the Federally required IMEF rating.[1] The minimum Federal requirement at the time of the 2015 IECC will be an IMEF of 1.84.[2] IMEF is energy use divided by washer volume. The Federal standard presumes 295 loads per year. So the base case, the standard reference design, for a typical 3.5 cubic foot washer is 1.84 x 3.5 x 295 = 550 kWh/yr (rounded). One of the biggest savings in new clothes washers comes from the reduced water in washed clothes, which saves energy in clothes drying. The effect of reduced clothes dryer energy is included in the Federally required IMEF rating.

The hot water use equation in the IECC is updated to reflect lower water use rates. The IECC water use equation has not been updated since the 1995 Model Energy Code, making the equation over 20 years old by the time of the 2015 IECC. Water use per residence has been falling for a long time.[3] Various sources estimate the decline in water use at 0.5 to 3% per year. The reduction in water use is expected to continue.[4] The primary factors that contribute to the reduction in hot water use since the 1995 IECC are more efficient washing machines and dishwashers, and water-use efficient faucets and showers, all a result of the National Appliance Energy Conservation Act that took effect in the mid 1990s.

This proposal adds lighting as an optional part of the performance calculation. Lighting requires a "base case" in the standard reference design and a calculation based on the proposed design. The standard reference design lighting energy use is based on the RESNET equation[6] for interior lighting energy use in homes, including garages. The standard reference equation is adjusted[6] for the higher percentage of efficient lighting (high efficacy lighting) required by the IECC.

The proposed lighting energy use is calculated as hours of use times watts. An average use of 1000 hours per year (2.75 hours per day) is within the reported range for actual light use[5] and is presumed. The proposed lighting annual energy use is simply 1 kWh per watt of installed lighting.

To "opt out" of the lighting calculation, the code user meets the Section R404.1 lighting requirements, then the performance calculation presumes the standard reference design and the proposed design are the same for lighting.

This proposal adds a refrigerator option as part of the performance calculation. It requires a "base case" in the standard reference design and a proposed refrigerator. The refrigerator base case is fixed at 600 kWh/yr. For comparison, a 3 bedroom house in the RESNET procedures would have a base case energy use of 691 kWh/yr. Federal minimum refrigerator efficiency standards will increase in 2014 [8,9]. Refrigerators are reduced about 25% in 2014 by the upcoming Federal standard, so 600 kHz/yr is reasonable as a "base case".

The internal gains equation is updated by this change. Internal gains are heat from various sources besides the heating system, including heat produced as a byproduct of lighting and refrigeration. The IECC internal gains equation has not been updated since the 2003 IECC, so it will be more than 10 years old in the 2015 IECC. Big reductions have come from more efficient lighting, as required by Section R404.1. Refrigerators have also reduced their energy use greatly in the last ten years, with a further reduction coming in 2014. The new internal gains equation is revised based on the lighting and refrigeration specifications in this proposed change.[10]

One big issue with having options for more efficient equipment and devices is inspection and verification. The efficiency used must be easy to verify. A new section, Section R405.7, requires that the efficiency used in the proposed design be specified on construction documents. Any equipment or device that meets or exceeds the efficiency marked on construction documents will be acceptable. Code enforcement staff does not have the time to look up equipment or device model numbers to find an efficiency rating in a data base or book; therefore, the new Section R405.7 requires that the installed efficiency be "readily observable", which is very similar to "readily accessible". "Readily observable" is the term used in Section R303.1.2 and C303.1.2 for the insulation R-value.

The performance calculation user may choose to calculate lighting energy use based on the installed watts of lighting. Lighting wattage will need to be verifiable, as lighting savings are based on the watts of installed lighting. Code officials are unlikely to have the time to count watts in a house. Where the proposed lighting energy use is calculated, this change requires a schedule of lighting fixture/lamp watts divided by rooms, which gives enough detail to spot check a house. If the proponents of this proposal were verifying lighting, they would pick a room and spot check it.

The performance calculation user may choose to use a more efficient hot water distribution system based on limiting the hot water volume in pipes. Hot water piping volume will need to be verified. Code officials are unlikely to have the time to check all the pipe volume calculations in a house. This change requires plumbing layouts with pipe sizes on the construction documents. For each branch the fixture with the largest hot water supply volume and that fixture's volume is identified on the plans. This level of detail will enable spot checking of a plumbing branch. If the proponents of this proposal were verifying efficient plumbing layout, they would pick one of the plumbing branches and check it.

The measures of efficiency in this change are based on existing tests and standards. The water heater efficiency is measured by the EF (energy factor), which is a rating required by Federal law. The clothes washer efficiency is measured by the IMEF (integrated modified energy factor), which is a rating required by Federal law. The refrigerator efficiency is measured by annual energy use (kWh), which is a Federal rating required to be on the Energy Guide label (yellow labels). The hot water distribution efficiency (efficient piping) is adapted from ICC 700-2012.

Overall, this proposed change allows residences to achieve the energy efficiency in the IECC in a variety of ways. It comes with the philosophy of keeping the energy efficiency goal high, but allowing that goal to be reached in many ways. This change provides options that are practical in the context of the code.

References:
1. IMEF (integrated modified energy factor) is MEF plus standby electricity use and will be the required Federal rating in 2015. The "IMEF" will be used for both the Federal requirements and Energy Star.
2. Upcoming Federal requirement is described at: https://www.federalregister.gov/articles/2012/05/31/2012-12320/energy-conservation-program-energy-conservation-standards-for-residential-clothes-washers#h-9
3. "*North America Residential Water Usage Trends Since 1992".* Paul Coomes, Tom Rockaway, Josh Rivard, and Barry Kornstein, Civil and Environmental Engineering, University of Louisville, Louisville, Kentucky. 2009.
4. "*Declining Residential Water Use".* Maureen Duffy. American Water. http://www.ela-iet.com/EMD/declining_residential_water_usage_final.pdf
5. *Updated Miscellaneous Electricity Loads and Appliance Energy Usage Profiles for Use in Home Energy Ratings, the Building America Benchmark Procedures and Related Calculations*. Danny Parker and Philip Fairey, Florida Solar Energy Center. Robert Hendron, National Renewable Energy Laboratory. FSEC-CR-1837-10 Revised June 10, 2011. Page 39.
6. The RESNET equation (kWh/yr = 445 + 0.8 x CFA) [5] presumes 10% of the lighting is fluorescent, while the IECC specifies 75% is high efficacy lighting. The most common light size is a 60 watt inconstant with an efficacy of about 13.3 lumens per watt (800/60). This can be replaced by a 14 watt compact fluorescent delivering the same level of light (lumens). The IECC requires lights of this size have an efficacy of 40 lumens per watt. Therefore high efficacy lamps use 13.3/40, or about 1/3 the power for the same lumen output. Overall, the RESNET equation is reduced by about 46% to account for the more efficient lighting. A short discussion of lumens per watt for incandescent and compact fluorescent lights is at: http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_lumens
7. This will favor, but not require, refrigerators without though the door ice, with freezer on the top rather than side-to-side, and smaller refrigerators. Many 18 ft^3 models easily exceed this. A variety of large (25 ft^3 or more) models also qualify; examples of large refrigerators that easily exceed this are at: http://www.toptenusa.org/Top-Ten-Refrigerators/Top-Ten-XL-Refrigerators
8. An announcement and overview of the new refrigerator standard is at: http://energy.gov/articles/department-energy-joins-manufacturers-environmentalists-announce-new-efficiency-standards
9. The requirements for different types of refrigerators are at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/43
10. Personal communication, Philip Fairey, Deputy Director, Florida Solar Energy Center.

Cost Impact: This code change proposal is expected to decrease the cost of construction by allowing the most cost-effective technologies and practices to be used in new homes.

R405.5.2(1)T-EC-CONNER-KLEIN-VANDECKER.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This proposal inappropriately allows a trade-off for envelope integrity with a piece of removable equipment. In addition, it raises the energy budget of the baseline standard reference design. Further, it does not stipulate "when the appliance is included…." This proposal provides not metrics relating the changes made to internal gains.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Craig Conner, Building Quality, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R405.7 (N1103.7) Equipment and device verification. The efficiency of the equipment and devices used for the proposed design shall be specified in the construction documents. The efficiency of the installed equipment and devices shall not be less than the efficiency specified in the construction documents. The efficiency of equipment and devices shall be indicated by the manufacturer on a label or on a specification sheet attached to the equipment or device. The equipment or device efficiency shall be readily observable for inspection after the equipment or device is installed. This section shall apply only to equipment and devices where the efficiency of the proposed design is different than the efficiency of the standard reference design for that equipment or device.

Commenter's Reason: Efficient equipment and devices presumed in the performance calculation need to be verified. This new section requires clear statements in construction documents about the efficiency that is presumed in the performance calculation. The new section makes it easy to inspect for the presence of that efficiency without having to go to any source outside the residence. The term "readily observable" is already in the IECC in Section R303.1.2 on insulation inspection and would require the efficiency to be easily observable for inspection.

This section would only apply to equipment and devices for which the performance calculation takes credit.

Public Comment 2:

Gary Klein, Affiliated International Management, LLC, representing self and Gerald Van Decker, RenewABILITY Energy Inc, representing self, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R405.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis.

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN[m]
~~Internal gains~~	~~IGain = 16,600 + 12 x *CFA* + 8080 x N_{br} (Btu/day per dwelling unit)~~ ~~N_{br}=Number of bedrooms~~	~~Same as standard reference design.~~
Service Water Heating [f, g, h, j, l]	Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum standards Use: gal/day = 20 + (10 × N_{br}) Tank temperature: 120°F N_{br}=Number of bedrooms	As proposed As proposed Use: Standard reference x SWHF Same as standard reference Design
~~Clothes washer [k, n]~~	~~550 kWh/yr~~	~~Either of the following:~~ ~~Same as standard reference design~~ ~~or~~ ~~(300 × IMEF), kWh~~

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN[m]
~~Lighting~~	~~300 + (0.43 x CFA), kWh/yr~~ ~~CFA = Conditioned floor area (ft^2)~~	~~Either of the following:~~ ~~Same as standard reference design and lighting is in compliance with Section R404.1~~ ~~or~~ ~~1 kWh/yr per watt of installed lighting~~
~~Refrigerator[n]~~	~~500 kWh / year~~	~~Either of the following:~~ ~~Same as standard reference design~~ ~~or~~ ~~As proposed~~

Portions of table not shown remain unchanged.

Footnotes not shown remain unchanged

j. SWHF = Service water heating factor. SWHF is the product of multiplying the hot water distribution efficiency factor and the drain water heat recovery factor.

Hot water distribution efficiency factor:

= 0.80
where a *demand recirculation water system* is installed for the hot water distribution system and the volume in the piping from the circulating hot water piping to the termination of the fixture supply for every fixture is less than or equal to 0.19 gallons (0.71 liters).

= 0.9
where the water volume in the piping from the water heater to the termination of the fixture supply for every fixture is less than or equal to 0.5 gallons (1.89 liters).

= 1.0
where the other conditions are not met.

Drain water heat recovery factor:

= (1 – (Drain water heat recovery unit efficiency x 0.36))
where one or more DWHR units receive the drain water from all showers in the building and the DHWR units are in accordance with Section R405.10.

= (1 – (Drain water heat recovery unit efficiency x 0.18))
where a DWHR unit receives the drain water from the primary shower but not all showers in the building and the DHWR unit is in accordance with Section R405.10.

= 1.0
where the other conditions are not met.

~~k. IMEF = integrated modified energy factor for the proposed clothes washer~~

l. Where more than one drain water heat recovery unit is used, the average efficiency of all drain water heater recovery units shall be used in the performance calculation.

~~m. Proposed design equipment and device efficiencies shall be in accordance with Section R405.7.~~

~~n. Where the proposed design includes more than one refrigerator or clothes washer, the energy use shall be summed.~~

~~**R405.7 (N1103.7) Equipment and device verification.** The efficiency of the equipment and devices used for the proposed design shall be specified in the construction documents. The installed equipment and devices shall not be less than the efficiency specified~~

~~in the construction documents. The efficiency of equipment and devices shall be indicated by the manufacturer on a label or on a specification sheet attached to the equipment or device. The equipment or device efficiency shall be readily observable for inspection after the equipment or device is installed. This section shall apply only to equipment and devices where the proposed design is different than the standard reference design for that equipment or device.~~

R405.8 (N1103.8) Hot water distribution verification. The construction documents for the building shall show plumbing diagrams that indicate water heaters, plumbing fixtures, plumbing appliances, pipe sizes and layouts for hot water supply and hot water circulating system piping. The layouts shall indicate the volume of water in the branches of the piping from the nearest source of hot water piping to the termination of the fixture supply pipe. This section shall apply only where the proposed design for the hot water distribution system is different than the standard reference design for the hot water distribution system.

~~**R405.9 (N1103.9) Lighting verification.** A schedule, by room, of lighting fixtures and lamps indicating the wattage of each fixture shall be provided for interior lighting and garage lighting. The sum of wattages on the schedule shall be used for the proposed design. This section shall apply only where the proposed design for lighting is different than the standard reference design for lighting.~~

~~**R405.10 (N1103.10) Drain water heat recovery units.** Drain water heat recovery units shall be tested by the manufacturer for efficiency and pressure loss at a flow rate of 2.5 gpm (9.5 L/m) through each water side flow path. The water side pressure loss shall not exceed 3 psi (20.7 kPa) for each flow path. The manufacturer shall indicate the efficiency and pressure loss of the unit on a label or specification sheet attached to the unit. This section shall apply only where the efficiency of drain water heat recovery is used in the performance calculation.~~

Commenters' Reason: The Committee's reasons were for the entire proposal. This comment addresses their concerns by limiting the changes to Service Water Heating. Water heating is one of the largest energy uses in new homes. The purpose of this comment is to enable builders who use the performance method to trade off the water heater equipment efficiency, hot water distribution system efficiency and the use of drain water heat recovery systems with other energy elements. Each of these measures are optional and non-mandatory.

The Committee approved a trade-off for water heater equipment efficiency in RE166. It is also included here to harmonize these credit(s). The two additional measures: "hot water distribution efficiency" and "drain water heat recovery" are both long long-lasting infrastructural components in homes, that are relatively simple to include during construction but often difficult to retrofit later.

Hot water distribution system efficiency is important because it limits the waste in delivering hot water to the point of water use. This does not limit hot water use, rather it limits hot water waste. Hot water must first flow through the pipes from the water heater to the point of use. Unless hot is water already in the pipes, the cooler water in the pipes must be emptied and replaced by hot water, which wastes water. After use the hot water left in the pipes cools down, unless there is another use within about an hour. The cool down is wasted heat. Thus hot water distribution routinely wastes both energy and water. Piping layouts with less water volume between the water heater and water use inherently waste less heat and less water. The two "distribution efficiency factors" and their savings for limiting wasted hot water are adapted for the IECC from the ANSI consensus standard ICC 700-2012 (National Green Building Standard). The factors, 0.90 and 0.80, represent a 10% and 20% savings respectively. As an additional benefit, limiting hot water waste means better performance, because the hot-water-user's wait for the "cold water to get hot" is the time it takes to replace cool water in the pipes with hot water and smaller water volumes are replaced more quickly.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this "coincident flow" occurs in homes with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. To put the "0.36" in the equation in perspective, the "coincident flow" in a residence is typically 50%-70% of the hot water use, so 0.36 (36%) times the device's efficiency is similar to saying the unit works well on showers and lavatories, and may also recover a portion of the rest of the hot water use in the home. The 0.36 also covers natural drain water heat loss and assumes the "worst-case" plumbing scenario for DWHR devices. This calculation of savings is conservative. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

It is important to ensure that DWHR devices do not have high pressure loss in order to minimize the impact on water pressure in the home. Although Section 405.10 has been taken out of this proposal, the safe installation of DWHR is still covered. The Committee approved CE273 Part III, which provides reference standards that cover DWHR technology safety and performance.

Public Comment 3:

Edward R. Osann, Natural Resources Defense Council, representing self, requests Disapproval.

Commenter's Reason: While the concept of this proposal has merit, the "hot water distribution efficiency factor" used to score the performance of hot water distribution systems is essentially arbitrary. More objective measures of the energy impacts of various hot water distribution configurations are needed to avoid over- or under-crediting such measures relative to better documented energy-saving measures.

RE172-13

Final Action: AS AM AMPC____ D

RE179-13

Table R405.5.2(1) (IRC Table N1105.5.2(1)), Table R405.5.2(3) (NEW) (IRC Table N1105.5.2(3) (NEW)), Chapter 5

Proposed Change as Submitted

Proponent: Neil Leslie, Gas Technology Institute representing self (Neil.Leslie@gastechnology.org)

Revise as follows:

Table R405.5.2(1) (N1105.5.2(1))
SPECIFICATION FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems[f ~~, g~~]	~~As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC—Commercial Provisions.~~ Equipment type: in accordance with Table R405.5.2(3) Efficiency: in accordance wtih Table C403.2.3 (4) Capacity: sized in accordance with Section R403.6	 As proposed As proposed
Cooling systems[~~f, h ,~~g]	~~As proposed~~ Equipment type: in accordance Table R405.5.2(3) Efficiency: in accordance with Table C403.2.3(1) Capacity: sized in accordance with Section R403.6.	 As proposed As proposed
Service water heating[~~f,g,h,i~~]	~~As proposed~~ ~~Use: same as proposed~~ Equipment type: in accordance with Table R405.5.2(3) Efficiency: in accordance with Table C404.2 Capacity: same as proposed	 As proposed As proposed gal/day=30 + (10 × N_{br}) N_{br} = Number of bedrooms

(Portions of table not shown remain unchanged)

~~f. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.~~
f ~~g~~. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.
g ~~h~~. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
~~i. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.~~

TABLE R405.5.2(3) (N1105.5.2(3))
EQUIPMENT MAP

SYSTEM	EQUIPMENT TYPE
Heating[a]	Warm air furnaces, natural gas fired
Cooling[a]	Air conditioners, air cooled
Service Water Heating[a]	Storage water heaters, natural gas

a. Systems meeting current National Appliance Energy Conservation Act minimum efficiency requirements.

Add new standard to Chapter 5 as follows:

DOE U.S Department of Energy
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, D.C 20402-9325

NAECA 87-(88) National Appliance Energy Conservation Act 1987 [Public Law 100-12 (with Amendments of 1988-P.L. 100-357)]

Reason: The intent of the IECC is clearly defined.

> **"Intent.** This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances."
>
> Source: 2012 IECC. Sections C101.3 and R101.3.

The code focus is "energy use… over the useful life of the building". Buildings will perform to the requirements of this code for a long time. So the intent of the code focuses on "energy use" over the life of the building. Under the performance path, the IECC compares the energy use of a baseline building to the energy use of a proposed building.

This proposal addresses a lingering weakness in the code for those seeking to use innovative energy efficient systems. Simulations provide the means and methods to more fully understand, quantify and model actual energy use, whatever its form. This revision specifies a single standard reference design for heating, cooling, and service water heating systems, using technologies with low energy costs and high source energy efficiency as the baseline in each building component category.

The revised text and tables:

- Establish a single baseline building performance requirement
  - for all service hot water (SHW) and HVAC systems
  - independent of making the system choice for the proposed building
  - at a realistic and achievable level using code-compliant technologies.
- Addresses the inconsistent mix of multiple prescriptive baseline building technology performance requirements in the current standard.
- Provides equitable and consistent treatment of all SHW and HVAC system options, including conventional, renewable energy, hybrid technology, and waste heat recovery options.
- Is indifferent to the SHW and HVAC system choice in the proposed building, comparing all SHW and HVAC system options against a single energy efficient baseline building energy cost or source energy performance requirement.
- Aligns the SHW and HVAC system performance requirement methodology with the envelope single baseline performance requirement methodology.

- Achieves the goal of reducing the site energy cost, consumption of primary energy resources, and global greenhouse gas emissions related to the operation of the building in a cost-effective and equitable manner.

A single technology-blind baseline performance requirement is the most technically defensible methodology for performance path calculations, and it is critical for equitable implementation of the IECC Performance Alternative requirements Section R405. Shifting to a single baseline design provides an equitable credit to all technologies that have lower annual energy costs or source energy consumption compared to the single baseline level irrespective of energy form or technology design.

The current code structure does not facilitate equitable comparison of mechanical systems based energy cost or source energy consumption.

IECC Section R405 currently uses multiple baseline mechanical system performance requirements. The mechanical systems are compared using multiple baselines by separating both categories of equipment and fuel types used within each equipment category. For example, the current code has 14 different baseline configurations across the five SHW system categories that may be relevant to the residential sector, none of which results in the same annual energy cost or source energy budget for performance path calculations. This mix of equivalencies is a counter-productive and inconsistent approach that can be mitigated by shifting to a single baseline building design for all proposed building design alternatives. The existing Section R405 also may be subject to various interpretations on the appropriate baseline design building for advanced multi-fuel appliance options, waste heat recovery options, or emerging technologies that reduce energy costs or source energy consumption significantly compared to options that currently qualify.

The baseline mechanical systems in the revised Table R405 use a single efficient baseline design for all proposed building configurations. The revised Table R405.5.2(1) and additional Table R405.5.2(3) apply a single baseline energy cost requirement consistently to any proposed mechanical system. The baseline does not prohibit any technology options. It correctly allows all options, including higher operating cost options, but considers their strong energy cost or source energy consumption disadvantages compared to the single baseline performance requirement. A designer who chooses a higher energy cost or source energy consumption option for the proposed building would only need to reduce the overall building energy cost or source energy consumption to the baseline level, and could do so through any combination of improved energy performance options, including HVAC, SHW, and envelope improvements.

The existing HVAC and SHW provisions are also inconsistent with standard reference baseline design criteria for envelope building components. Those building element provisions do not prescribe specific technology categories or subcategories, but are true performance based requirements (e.g., envelope requirements in overall U value) that give the designer maximum flexibility BEFORE making technology choices in the design. The designer is free to choose the most cost-effective envelope technology (fiberglass, polyurethane foam) to meet the single energy target for the building without arbitrary technology class prescriptive requirements for fiberglass or foam insulation. Unfortunately, the existing provisions of HVAC and SHW tables impose technology category and subcategory prescriptive requirements when using the performance path instead of true performance-based requirements. The impact is to establish the reference design building AFTER prescriptive technology category and energy design choices are made. This is an inequitable application of prescriptive requirements in the performance path. This constraint eliminates the credit for creative design choices that would significantly reduce energy cost, primary energy use, and greenhouse gas emissions.

The revised tables and text completely decouple the proposed building design choices from the standard reference design building's energy cost or source energy performance requirement. The reference energy and technology choices in the revised section were selected to provide a practical and effective requirement to meet the intent of the standard while still offering appropriate incentives for the best available technologies based on their energy cost benefits. Encouraging rather than discouraging this design flexibility aligns closely with the IECC stated goal of reducing energy costs by 30 percent compared to the 2012 version.

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

R405.5.2(1)T-EC-LESLIE.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This proposal could have the possible effect of preemption of Federal Standards.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Mark Krebs, Laclede Gas Company, representing self, requests Approval as Submitted.

Commenter's Reason: The committee's decision to disapprove this critical proposal is not based on facts and is inconsistent with the stated intent of the IECC to provide "model code regulations that will result in the optimal utilization of fossil fuel and nondepletable resources in all communities, large and small." The current provisions treat various technology options as equivalent to each other even though there are demonstrable and meaningful differences in energy cost and source energy use among the fuel choice and technology options, especially for electric resistance and natural gas options. This results in suboptimal utilization of fossil fuels because significantly more coal and natural gas are burned in power plants to provide electricity for inefficient qualifying electric technologies than would be consumed by burning natural gas directly in the home using the more source energy efficient and lower energy cost gas technology. The current provisions result in meaningful fuel bias that the proposal fully corrects by changing to fuel blind, single baseline compliance provisions.

The hearing committee erred in two significant ways in their stated rationale at the hearing and as reported in the summary of the hearing. The first error relates to the confusion about "lack of natural gas" in many areas of the country, and the resulting error by the committee rejecting the proposal as untenable for this reason. Natural gas availability is not the issue. Energy cost budget or source energy budget calculation is the correct issue for judging this proposal. Those metrics do not require natural gas availability in the proposed building for determining the compliance requirement. The necessary simulation for determination of the energy cost or source energy budget for the proposed home only requires that suitable natural gas cost or source energy information be available for use in the simulation. Natural gas cost information is already available and required by the IECC for other calculations in locations that have natural gas service availability. For locations that do not have natural gas service, a choice of local, state, provincial, or regional gas prices can easily be incorporated into the tool for determining the residential building's energy cost budget. It is even easier to implement when using the source energy path because the IECC already includes the necessary conversion factors for all locations and situations. The proposal is simple to implement and easily applied to all residential buildings.

The second error made by the committee is stated in the written summary as the only rationale for rejection: "This proposal could have the possible effect of preemption of Federal Standards." That rationale is completely false. There is no prohibition against any appliance as a result of this proposal, thus there is no possible federal preemption effect. This proposal allows determination of an efficient, equitable energy cost budget (or source energy budget) at a level of performance using low energy cost and source energy efficient options to determine the baseline performance level. The proposal is fuel and technology agnostic, and is completely consistent with Federal Standard preemption provisions. If the disapproval relied on the stated rationale, the disapproval is dismissive and non-responsive to the proposal's significant consumer and societal benefits.

The most useful comparison illustrating the inherent flaw in the IECC methodology is a minimally compliant electric storage water heater compared to a minimally compliant gas storage water heater. Homes using NAECA minimum efficiency electric resistance storage water heating qualify equally as a NAECA minimum gas storage water heater, even though both the annual energy costs and primary energy consumption are much higher for the resistance water heater than for the gas water heater (typically twice as high). Based on a typical home in Laclede's service territory, annual energy use for an NAECA minimum electric resistance water heater is 3,920 kWH, while a NAECA minimum gas water heater uses 205 therms. Using average Missouri energy rates available from EIA of $0.098 per kWh and $1.05 per therm, the electric water heater annual cost of operation is $384, while the natural gas water heater costs only $215 per year, a 79% increase in the energy cost budget for the electric water heater. Using the respective source energy conversion factors of 3.16 and 1.1 in the IECC, the source energy consumption of the electric water heater is 42.3 MBtu while the source energy consumption for the gas water heater is only 22.6 MBtu, an 87% increase in the source energy budget for the electric water heater. IECC considers them equal for compliance purposes because it uses a separate, biased reference home for determining compliance for electric water heating systems. The higher energy cost and source energy represent harmful costs to the consumers and society. It is this "best efforts" harmful bias that the proposed shift to a single baseline system methodology fully corrects.

ASHRAE Standard 90.1-2013 will include a new single baseline system methodology in the performance path for all new commercial buildings. This methodology is identical to the single baseline mechanical system methodology proposed in RE179. The 90.1 single baseline tables are more sophisticated than those in RE179 to accommodate the wide variety of building types and regional building practices in the commercial sector. By including the proposed methodology in the residential provisions of the 2014 IECC, the residential and commercial provisions will be internally consistent.

Public Comment 2:

Neil Leslie, Gas Technology Institute representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R405.5.2(1)
SPECIFICATION FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems[f]	Efficiency: from Table ~~C403.2.3(4)~~ C403.2.3 (2)	
Cooling systems[g]	Efficiency: from Table ~~C403.2.3(1)~~ C403.2.3(2)	

Table R405.5.2(3)
EQUIPMENT MAP

SYSTEM[a]	EQUIPMENT TYPE

Heating[a]	~~Warm air furnaces, natural gas fired~~ Air cooled (heating mode)
Cooling[a]	~~Air conditioners,~~ air cooled (cooling mode)
Service Water Heating[a]	~~Storage w~~Water heaters, ~~natural gas~~ electric, Resistance Subcategory

Commenter's Reason: The amendment to the single baseline system proposal in RE179-13 is intended to address the specific concerns expressed at the hearing and in the rationale for disapproval. By shifting to electric technologies for all baseline systems, there is no longer an issue (real or perceived) with fuel choice availability. Electric technologies are considered always available as long as electricity is provided to the home, either through the grid or through on site power generation.

The amendment also provides another way to allay fears about Federal Standard preemption. There is no prohibition against any appliance as a result of either the original proposal or this amendment, thus there is no possible federal preemption effect. However, this amendment allows determination of an equitable energy cost budget (or source energy budget) at a level of performance using compliant electric technology options with relatively more permissive energy cost and source energy budgets to determine the baseline performance level. The proposal and this amendment both are fuel and technology agnostic, and both are completely consistent with Federal Standard preemption provisions.

The key difference between the original proposal and this amendment is the choice between rewarding better performance or penalizing worse performance. The original proposal rewards exceptional performance while penalizing poorer performance relative to the more stringent energy cost and source energy budgets when using the natural gas baseline systems. In this amendment, appliance options such as natural gas heating and water heating systems that improve the energy performance of the home (i.e., lower energy cost or source energy consumption), are rewarded compared to the fully compliant baseline electric heat pump and resistance water heating systems. Tradeoffs based on the energy cost or source energy budget add flexibility to the design options and are more lenient than the original proposal. At the same time, options that are currently compliant under the separate, biased baseline budget methodology are not penalized because they are the baseline systems in this amendment.

With either the original proposal or this amendment, the IECC has already chosen the right metrics for energy performance, with the choice of energy cost budget (for adopting authorities mainly concerned about the homeowner's economic objectives), or source energy budget (for adopting authorities mainly concerned about the homeowner's energy consumption impacts on primary energy consumption). The proposal provides the critical single baseline budget methodology to implement these metrics correctly. It is only by implementing the correct metrics correctly through the single baseline methodology that the IECC can avoid adverse effects and unintended consequences on users of the standard.

There is another development in 2013 that corroborates the proposal and a shift to an equitable single baseline methodology for consistency. ASHRAE Standard 90.1-2013 (a deemed to comply option in IECC-2014) will include for the first time a new single baseline system methodology in the performance path for all new commercial buildings. This methodology is identical to the single baseline mechanical system methodology proposed in RE179. The 90.1 single baseline tables are more sophisticated than those in RE179 to accommodate the wide variety of building types and regional building practices in the commercial sector. By including the proposed methodology in the residential provisions of the 2014 IECC, the residential and commercial provisions will be internally consistent.

RE179-13

Final Action: AS AM AMPC____ D

RE181-13
Table R405.5.2(1) (IRC N1105.5.2(1))

Proposed Change as Submitted

Proponent: Jeff Sonne, Florida Solar Energy Center representing the Florida Solar Energy Center (jeff@fsec.ucf.edu)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing[a]	Total area[b] = ~~(a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area.~~ ~~(b)~~ 15% of the conditioned floor area~~; where the proposed glazing area is 15% or more of the conditioned floor area.~~	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: ~~0.92-(0.21 × SHGC for the standard reference design)~~	As proposed ~~0.92-(0.21 × SHGC as proposed)~~
	Summer: 0.70	Same as Standard Reference Design
	Winter: 0.85	Same as Standard Reference Design
	External shading: none	As proposed

(Portions of Table not shown remain unchanged)

Reason:

Glazing Area

Glazed areas are the least efficient and most costly components of homes. Even the best windows and glass doors admit much more solar heat gain than walls, roofs and floors. And even the best windows and doors have thermal conductances that are far inferior to walls, roofs and floors.

Table 1 below presents the 2012 IECC requirements for envelope components in IECC climate zone 2. While there are no IECC requirements for the SHGC of opaque envelope components like walls, ceilings and floors, an equivalent SHGC can be calculated using the component U-Factor, a reasonable sol-air temperature, a reasonable interior temperature (75 ^{o}F) and a reasonable incident solar radiation, as follows:

$$SHGC_{equiv} = U\text{-}Factor*(T_{sol\text{-}air} - T_{int}) / (Solar_{Incident})$$

For Table 1, the assumed sol-air temperatures were 140 ^{o}F for walls and 160 ^{o}F for roofs (ceilings) and the assumed incident solar radiation was 250 Btu/h for walls and 300 Btu/h for roofs (ceilings). Floors receive no solar radiation and thus do not experience heat gains due to direct solar radiation as do fenestration, walls and roofs (ceilings).

Table 1. Envelope Component Efficacies

Envelope Component	IECC* U-Factor	U-Factor Ratio	IECC* SHGC	SHGC Ratio
Fenestration	0.400	1.00	0.250	1.00
Frame walls	0.082	4.88	0.021**	11.73
Mass walls	0.165	2.42	0.043**	5.83
Ceilings	0.030	13.33	0.009**	29.41
Floors	0.064	6.25	0.000**	∞

* IECC U-Factor and SHGC values for Climate Zone 2
** Computed estimate

The U-Factor and SHGC ratios in Table 1 compare the heat retardation efficacy of each of the other envelope components to the heat retardation efficacy of fenestrations. These ratios show that the opaque envelope components are 2.42 to 13.33 times as efficacious in retarding heat flow by conductance as fenestrations and 5.83 to 29.41 times as efficacious in retarding solar heat gains as fenestrations.

Per unit area, fenestrations are also the most expensive envelope components in new homes. Estimates from the 2011 R.S. Means Residential Cost Data show typical code compliant concrete block wall construction prices to be about $15/ft^2 while typical code compliant window prices are somewhat more than double this amount, at about $32/ft^2.

The data show that fenestrations are relatively costly home amenities, which are not particularly energy efficient compared with other envelope components. The principle function of fenestration is to visually bring the outdoors into the comfort conditioned interior living space. Thus, cost is the principle determinant of fenestration area as a percentage of conditioned floor area, with larger fenestration percentages much more likely in high-end, expensive homes than in low-end, smaller homes.

Reductions in glazing area improve the energy performance of homes. If homes are evaluated on an energy performance basis then, all other things being equal, the home with the smaller window area will have less energy consumption. That being the case, a simulated performance alternative should recognize this smaller energy consumption rather than adjust the Standard Reference Design glazing area such that this smaller energy use is effectively disallowed as an energy performance characteristic of the home.

Most homes that choose smaller fenestration area are small, low-cost homes. Thus, the choice to incorporate less fenestration area is an economic decision – made to reduce the cost of the home. The fact that these homes are smaller than the typical new home also significantly reduces the energy use of the home compared to the more typical larger new home. As a result, this “sliding” glazing area in the 2012 IECC Standard Reference Design actually requires the smaller, low-cost home with less window area to meet a higher energy performance standard than the larger more energy intensive typical home. This constitutes a strong affirmation of the old saw that “no good deed shall go unpunished.”

For reasons of cost effectiveness and the equitable treatment of smaller, low-cost homes, the Code should set a single standard for glazing area in the Standard Reference Design and not allow it to “float down” with the window area of the Proposed Design.

<u>Interior Shading Coefficient</u>

The 2012 IECC modifies the interior shading coefficient of fenestrations as a function of the SHGC of the fenestration. It does this in both the Standard Reference Design and the Proposed Design. The equation for the 2012 IECC interior shading coefficient is as follows:

Interior Shade = 0.92 * (0.21*SHGC)

Compared with the 2009 IECC interior shading coefficients, which were not dependent on the SHGC of the fenestration but were based on the likely behavior of the home occupants, this equation effectively penalizes high performance windows in climates like Florida where lower SHGCs are desirable. The equation shows that the better the SHGC (lower is better in Florida), the lower the interior shading coefficient. Thus, a window with a SHGC of 0.5 would have an interior shading coefficient of 0.82 while a window with a SHGC of 0.2 would have an interior shading coefficient of 0.88. This results in the poorer performing window getting more energy performance credit from interior shading than the better performing window.

Table 2 examines how the change from the 2009 IECC interior shading coefficients to the 2012 IECC interior shading coefficients impact projected performance. A 2-story, 2400 ft^2, slab-on-grade frame wall IECC 2012 Standard Reference Design home is used for both sets of simulations. The only change is the manner in which interior shading is treated. The values in the table are the annual kWh for heating and cooling in the cities specified.

Table 2. H&C Interior Shading Example

Condition	Miami	Orlando	Tally
IECC 2009	4981	3507	3426
IECC 2012	5237	3685	3579
kWh change	256	178	153
% change	5.1%	5.1%	4.5%

Table 2 shows that these high performance (SHGC-0.25) windows show 4.5% - 5.1% greater energy use for the IECC 2012 interior shading coefficient specification than for the 2009 IECC interior shading coefficient specification. This means that these high-performance windows will achieve less energy performance credit using the 2012 IECC specification that they do using the 2009 IECC specification. Surely this was not the intent of the 2012 change to the IECC interior shading coefficient.

In addition to the performance differences shown in Table 2, the 2012 IECC interior shading coefficients also do not reflect the likely behavior of the occupants. Occupants are more likely to use shades and blinds principally for privacy reasons but are also likely to use somewhat more shades and blinds during the air conditioning season to keep the sun out of the living space and use somewhat less shades and blinds during the heating season to let the sun into the living space. This occupant behavior is reflected in the 2009 IECC interior shading coefficient specification but abandoned for unknown reasons in the 2012 IECC interior shading coefficient specification.

Based on this analysis, the proponent recommends that the IECC set a single, non-floating window area to conditioned floor area ratio of 15% for the Standard Reference Design and that the IECC 2009 specification for interior shading coefficient be maintained for both the Standard Reference Design and the Proposed Design.

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

R405.5.2(1)T-EC-SONNE.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Consistent with action taken on RE181-13.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeff Sonne representing Florida Solar Energy Center, requests Approval as Submitted.

Commenter's Reason: Proposal RE164-13 was approved as submitted. We have submitted a separate comment recommending that RE164-13 be disapproved, and repeat the comment here in support of alternative proposal RE181-13.

RE164-13 is inconsistent with the direction taken by all other programs having reference homes. DOE's Builder's Challenge program and EPA's EnergyStar program take exception with IECC and limit the percent glass of the reference home so that homes that use more energy due to large window areas have to make it up. It is difficult to consider the IECC as a serious energy code with unlimited glass areas receiving no penalty. In our experience it is large homes that tend to have 25% to 40% glass-to-floor area, requiring substantially more heating and air conditioning. Windows are better than they used to be, but they are a weak component in the building envelope. The agreement made in 2003 was erroneous. The prescriptive method should also have a window area limitation forcing the UA or performance method. Please don't make the code worse, reject RE164-13. We still stand behind RE181-13 as an appropriate solution.

RE181-13

Final Action: AS AM AMPC____ D

RE186-13
R202 (IRC N1101.9), R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 (NEW))

Proposed Change as Submitted

Proponent: William Fay, Energy Efficient Codes Coalition; Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise follows:

SECTION R401 (N1101)
GENERAL

R401.2 (IRC N1101.15)Compliance. Projects shall comply with Sections identified as "mandatory" and with either sections identified as "prescriptive" or the simulated performance alternative ~~approach~~ in Section R405. In addition, all projects shall comply with Section R406.

SECTION R406 (N1106)
ADDITIONAL ENERGY EFFICIENCY (MANDATORY)

R406.1 (N1106.1)Scope. This section establishes additional mandatory requirements applicable to all compliance approaches to achieve additional energy efficiency.

R406.2 (N1106.2)Points-based compliance. One or more energy efficiency measure(s) shall be installed in accordance with Section R406.3 that cumulatively equal or exceed 5 (five) Flex Points for the appropriate Climate Zone. Projects complying under the simulated performance alternative outlined in Section R405 shall demonstrate compliance with Section R405 without including in the proposed design any features that will be utilized to comply with Section R406.

Exception~~s~~: The requirements of this section shall not apply to:

1. Projects complying under the performance approach outlined in Section R405, where the *proposed design* under section R405.3 is shown to have an annual energy cost that is less than or equal to 95% of the annual energy cost of the *standard reference design.*
2. Projects with an on-site or building integrated renewable energy system installed that provides not less than 0.50 watts per square foot (5.4 W/m2) of *conditioned floor area*.
3. Additions with a *conditioned floor area* equal to or less than 1,000 square feet.
4. *Alterations*, renovations and *repairs* to an existing building.

R406.3 (N1106.3) Flex Points for additional energy efficiency. Measures shall be selected from the applicable Flex Points Table based on the applicable federal minimum equipment efficiency established by federal rule for that state that applies to the specified heating and cooling equipment on the date that a permit is issued. Each measure chosen shall receive credit for the Flex Points as indicated in the applicable Table for the specific Climate Zone. Interpolation of points between measures shall not be permitted.

R406.3.1 (N1106.3.1) Use of Flex Points Table R406.3.1. In states where the applicable federal minimum efficiencies are less than or equal to 80 AFUE for non-weatherized gas residential furnaces, equal to 7.7 HSPF for split system heat pumps, and equal to 13 SEER for split system air conditioners, Table R406.3.1 shall be used.

TABLE R406.3.1 (N1106.3.1)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure	Measure Description	Flex Point Value

Number		CZ 1	CZ 2	CZ 3	CZ 4	CZ 4C [a]	CZ 5	CZ 6	CZ 7	CZ 8
1a	≥ 2.5% reduction in total UA [b]	2	2	2	2	2	2	3	4	4
1b	≥ 5% reduction in total UA [b]	3	3	3	3	3	4	5	5	5
1c	≥ 7.5% reduction in total UA [b]	5	5	5	5	5	6	7	8	8
1d	≥ 10% reduction in total UA [b]	6	7	7	7	8	8	9	10	10
2a	≥ 10% reduction in glazed fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-
2b	≥ 20% reduction in glazed fenestration area-weighted average SHGC	4	1	-	-	-	-	-	-	-
3a	≤ 4 ACH50 air leakage rate with ERV or HRV installed [c]	1	2	-	-	-	-	-	-	-
3b	≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]	2	4	5	6	7	7	7	8	8
3c	≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]	2	5	7	9	9	9	10	11	11
4a	≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2	1	1	1	1	-	1	1	1	1
4b	100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*	1	1	1	1	1	1	2	2	2
4c	100% of duct thermal distribution system located in *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
4d	100% of ductless thermal distribution system located in *passively conditioned space* and/or *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
4e	100% of hydronic thermal distribution system located in *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
5a	≥ 15 SEER and ≥ 12.5 EER cooling system efficiency [e]	4	3	1	1	-	-	-	-	-
5b	≥ 16 SEER and ≥ 13 EER cooling system efficiency [e]	7	5	2	1	-	-	-	-	-
5c	≥ 18 SEER and ≥ 14 EER cooling system efficiency [e]	11	8	3	2	-	1	-	-	-
5d	≥ 16 EER cooling system efficiency [e]	11	8	3	2	-	1	-	-	-
5e	≥ 18 EER cooling system efficiency [e]	15	11	4	3	-	1	-	-	-
5f	≥ 20 EER cooling system efficiency [e]	17	13	5	3	-	1	1	-	-
6a	≥ 90 AFUE heating system efficiency [f]	-	1	4	6	6	7	7	8	9
6b	≥ 92 AFUE heating system efficiency [f]	-	2	5	7	7	8	9	10	11
6c	≥ 95 AFUE heating system efficiency [f]	-	2	6	8	9	10	11	12	13
6d	≥ 96 AFUE heating system efficiency [f]	-	2	6	9	10	10	11	12	14
6e	≥ 98 AFUE heating system efficiency [f]	-	3	7	10	11	12	13	14	15
7a	≥ 8.8 HSPF heating system efficiency [f]	-	-	1	1	2	2	2	2	1
7b	≥ 9.5 HSPF heating system efficiency [f]	-	1	2	3	3	4	4	4	3
7c	≥ 10.5 HSPF heating system efficiency [f]	-	1	3	6	6	7	6	5	5

7d	≥ 3 COP heating system efficiency [f]	-	1	3	5	5	6	5	5	4
7e	≥ 3.5 COP heating system efficiency [f]	-	2	5	8	8	9	9	9	7
7f	≥ 4 COP heating system efficiency [f]	-	3	6	10	10	12	11	10	8
8a	≥ 0.7 EF for fossil fuel service water heating system	-	-	-	-	-	-	-	-	-
8b	≥ 0.8 EF for fossil fuel service water heating system	4	3	3	2	2	2	1	1	1
8c	≥ 0.95 EF for electric service water heating system	-	-	-	-	-	-	-	-	-
8d	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2	1
8e	≥ 0.4 Solar Fraction for service water heating system	6	7	9	7	9	6	5	4	3

a. Climate Zone 4C is Climate Zone Marine 4.
b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.
c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).
d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.
e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.1 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.
f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.1 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

R406.3.2 (N1106.3.2) Use of Flex Points Table R406.3.2.. In states where the applicable federal minimum efficiencies are less than or equal to 80 AFUE for non-weatherized gas residential furnaces, equal to 8.2 HSPF for split system heat pumps, and less than or equal to 14 SEER for split system air conditioners, Table R406.3.2 shall be used.

TABLE R406.3.2 (N1106.3.2)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Flex Point Value								
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 4C [a]	CZ 5	CZ 6	CZ 7	CZ 8
1a	≥ 2.5% reduction in total UA [b]	1	1	2	2	2	2	3	4	4
1b	≥ 5% reduction in total UA [b]	3	3	3	3	3	4	5	5	5
1c	≥ 7.5% reduction in total UA [b]	5	5	5	5	5	6	7	8	8
1d	≥ 10% reduction in total UA [b]	6	7	7	7	8	8	9	10	10
2a	≥ 10% reduction in glazed fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-
2b	≥ 20% reduction in glazed fenestration area-weighted average SHGC	4	1	-	-	-	-	-	-	-
3a	≤ 4 ACH50 air leakage rate with ERV or HRV installed [c]	1	2	-	-	-	-	-	-	-
3b	≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]	2	4	5	7	7	7	7	8	8
3c	≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]	2	5	7	9	9	9	10	11	11

4a	≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2	1	1	1	1	-	1	1	1	1
4b	100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*	1	1	1	1	1	1	2	2	2
4c	100% of duct thermal distribution system located in *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
4d	100% of ductless thermal distribution system located in *passively conditioned space* and/or *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
4e	100% of hydronic thermal distribution system located in *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
5a	≥ 15 SEER and ≥ 12.5 EER cooling system efficiency [e]	2	2	1	-	-	-	-	-	-
5b	≥ 16 SEER and ≥ 13 EER cooling system efficiency [e]	5	4	1	1	-	-	-	-	-
5c	≥ 18 SEER and ≥ 14 EER cooling system efficiency [e]	9	7	3	2	-	-	-	-	-
5d	≥ 16 EER cooling system efficiency [e]	10	7	3	2	-	-	-	-	-
5e	≥ 18 EER cooling system efficiency [e]	13	10	4	2	-	1	-	-	-
5f	≥ 20 EER cooling system efficiency [e]	16	12	5	3	-	1	-	-	-
6a	≥ 90 AFUE heating system efficiency [f]	-	2	4	6	6	7	8	8	9
6b	≥ 92 AFUE heating system efficiency [f]	-	2	5	7	7	8	9	10	11
6c	≥ 95 AFUE heating system efficiency [f]	-	2	6	8	9	10	11	12	13
6d	≥ 96 AFUE heating system efficiency [f]	-	2	6	9	10	10	11	12	14
6e	≥ 98 AFUE heating system efficiency [f]	-	3	7	10	11	12	13	14	15
7a	≥ 8.8 HSPF heating system efficiency [f]	-	-	-	-	-	-	-	-	-
7b	≥ 9.5 HSPF heating system efficiency [f]	-	-	1	2	2	2	2	2	1
7c	≥ 10.5 HSPF heating system efficiency [f]	-	1	2	4	4	5	4	3	3
7d	≥ 3 COP heating system efficiency [f]	-	1	2	3	3	4	3	3	2
7e	≥ 3.5 COP heating system efficiency [f]	-	2	4	6	6	8	7	6	5
7f	≥ 4 COP heating system efficiency [f]	-	2	5	8	9	10	10	9	7
8a	≥ 0.7 EF for fossil fuel service water heating system	2	2	-	-	-	-	-	-	-
8b	≥ 0.8 EF for fossil fuel service water heating system	7	5	4	3	2	2	2	1	1
8c	≥ 0.95 EF for electric service water heating system	-	-	-	-	-	-	-	-	-
8d	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2	2
8e	≥ 0.4 Solar Fraction for service water heating system	8	9	9	7	9	6	5	4	3

a. Climate Zone 4C is Climate Zone Marine 4.
b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.
c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).

d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.
e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.2 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.
f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.2 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

R406.3.3 (N1106.3.3) Use of Flex Points Table R406.3.3. In states where the applicable federal minimum efficiencies are equal to 90 AFUE for non-weatherized gas residential furnaces, equal to 8.2 HSPF for split system heat pumps, and less than or equal to 14 SEER for split system air conditioners, Table R406.3.3 shall be used.

TABLE R406.3.3 (N1106.3.3)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Flex Point Value								
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 4C [a]	CZ 5	CZ 6	CZ 7	CZ 8
1a	≥ 2.5% reduction in total UA [b]	1	1	2	2	2	2	3	4	4
1b	≥ 5% reduction in total UA [b]	3	3	3	3	3	4	4	5	5
1c	≥ 7.5% reduction in total UA [b]	4	5	5	5	5	6	7	8	8
1d	≥ 10% reduction in total UA [b]	6	7	7	7	7	8	9	10	10
2a	≥ 10% reduction in glazed fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-
2b	≥ 20% reduction in glazed fenestration area-weighted average SHGC	4	2	-	-	-	-	-	-	-
3a	≤ 4 ACH50 air leakage rate with ERV or HRV installed [c]	1	2	-	-	-	-	-	-	-
3b	≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]	2	4	5	6	7	7	7	8	8
3c	≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]	2	5	7	9	9	9	10	11	11
4a	≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2	1	1	1	1	-	1	1	1	1
4b	100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*	1	1	1	1	1	1	2	2	2
4c	100% of duct thermal distribution system located in *actively conditioned space* [d]	8	8	9	10	8	12	15	17	17
4d	100% of ductless thermal distribution system located in *passively conditioned space* and/or *actively conditioned space* [d]	8	8	9	10	8	12	15	17	17
4e	100% of hydronic thermal distribution system located in *actively conditioned space* [d]	8	8	9	10	8	12	15	17	17
5a	≥ 15 SEER and ≥ 12.5 EER cooling system efficiency [e]	2	2	1	-	-	-	-	-	-
5b	≥ 16 SEER and ≥ 13 EER cooling system efficiency [e]	5	4	1	1	-	-	-	-	-
5c	≥ 18 SEER and ≥ 14 EER cooling system	9	7	3	2	-	-	-	-	-

	efficiency [e]									
5d	≥ 16 EER cooling system efficiency [e]	10	7	3	2	-	-	-	-	-
5e	≥ 18 EER cooling system efficiency [e]	13	10	4	2	-	1	-	-	-
5f	≥ 20 EER cooling system efficiency [e]	16	12	5	3	-	1	-	-	-
6a	≥ 90 AFUE heating system efficiency [f]	-	-	-	-	-	-	-	-	-
6b	≥ 92 AFUE heating system efficiency [f]	-	-	-	1	1	1	1	1	1
6c	≥ 95 AFUE heating system efficiency [f]	-	-	2	2	3	3	3	4	4
6d	≥ 96 AFUE heating system efficiency [f]	-	1	2	3	3	4	4	4	5
6e	≥ 98 AFUE heating system efficiency [f]	-	1	3	4	4	5	5	6	6
7a	≥ 8.8 HSPF heating system efficiency [f]	-	-	-	-	-	-	-	-	-
7b	≥ 9.5 HSPF heating system efficiency [f]	-	-	1	2	2	2	2	2	1
7c	≥ 10.5 HSPF heating system efficiency [f]	-	1	2	4	4	5	4	3	3
7d	≥ 3 COP heating system efficiency [f]	-	1	2	3	3	4	3	3	2
7e	≥ 3.5 COP heating system efficiency [f]	-	2	4	6	6	8	7	6	5
7f	≥ 4 COP heating system efficiency [f]	-	2	5	8	9	10	10	9	7
8a	≥ 0.7 EF for fossil fuel service water heating system	2	2	1	-	-	-	-	-	-
8b	≥ 0.8 EF for fossil fuel service water heating system	7	5	4	3	2	2	2	1	1
8c	≥ 0.95 EF for electric service water heating system	-	-	-	-	-	-	-	-	-
8d	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2	1
8e	≥ 0.4 Solar Fraction for service water heating system	8	9	9	7	9	6	5	4	3

a. Climate Zone 4C is Climate Zone Marine 4.
b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.
c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).
d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.
e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.3 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.
f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.3 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

Revise as follows:

SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

CONDITIONED SPACE. An area ~~or room~~ within a building that is either *actively conditioned space* or *passively conditioned space* ~~being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*~~.

ACTIVELY CONDITIONED SPACE. An area within a *building thermal envelope* that is directly heated or cooled, including any habitable room.

PASSIVELY CONDITIONED SPACE. An area within a *building thermal envelope* that is not directly heated or cooled, including wall cavities, floor cavities, ceiling cavities, storage rooms, closets, non-habitable attic, non-habitable basement, crawlspace, spaces or cavities that contain uninsulated ducts or thermal distribution systems or have an opening directly into an adjacent conditioned space.

Reason: The purpose of this code change is to establish a new mandatory section to achieve additional energy efficiency. This proposal will allow builders the flexibility to choose from a menu of options to achieve 5% or more in energy savings beyond compliance with the current prescriptive or performance paths in the 2012 *IECC*. The new mandatory set of points-based options are predicated on the notion that because the current residential I-Codes require a solid foundation of "whole house" efficiency features, builders should have flexibility to determine the improvements that add onto that foundation. In addition to bringing about a reasonable, but modest, improvement in energy efficiency in the 2015 *IECC*, the proposal will also lay the groundwork for emerging technologies and future improvements to the code. Similar options-based approaches are currently found in both the commercial provisions of the 2012 *IECC* (section C406) and in residential codes adopted in a number of states. As discussed below, this proposal improves the *IECC* in at least five important ways:

The proposal improves the overall energy efficiency of the *IECC* and *IRC* by about five percent, reducing the home's energy consumption and homeowner operating costs.

From a national energy policy standpoint, the need to improve the efficiency of America's buildings has not changed. Because buildings continue to consume over 50% of the natural gas and over 70% of the electricity consumed in America, the nation's building codes should incorporate reasonable measures to reduce energy use and peak demand wherever feasible. The residential requirements of the 2012 *IECC* represent significant improvements over previous editions of the code, and we believe that an additional 5% improvement in efficiency in the 2015 *IECC* is not only feasible, but is crucial to sound national energy policy and our nation's energy future. Each new building and substantial addition should bring the country one step closer to our national goal of energy independence.
In addition, energy efficient construction generates significant operating savings that quickly recoup the incremental cost of these improvements to new homebuyers. For example, when the US Department of Energy compared homes built to the 2012 *IECC* with homes built to the 2006 *IECC*, average homeowner life-cycle (30-year) cost savings ranged from $4,763 in Climate Zone 2 (the lowest savings in all climate zones) to $33,105 in Climate Zone 8 (the highest savings). And, even after accounting for the incremental up-front costs of mortgage fees and down payment, a homeowner's cumulative cash flow became positive within a year or two in all eight climate zones.

The proposal creates a highly flexible method to achieve additional energy savings that would be difficult to require in the current *IECC* and *IRC* structure.

Although there are many possible improvements beyond the 2012 *IECC*, some of these improvements would be impractical or difficult to include as prescriptive requirements at this time. For example, some emerging technologies may save energy, but because of limited availability, high cost, or federal laws, it may not be reasonable – or even legal – to require these technologies in every building. The *IECC* does not currently have an organized method for recognizing specific prescriptive options beyond the baseline requirements.
This proposal creates an approach and format that recognizes the energy savings potential of a range of systems and building features that otherwise would not be feasible to include in the baseline requirements at this time. For example, the proposal includes high-efficiency heating, cooling, and water heating options that could not be required outright because of federal preemption issues. The proposal also includes envelope-only measures that reward builders for going well beyond the current code requirements. The result is a reasonably flexible system of options that builders can choose from that goes beyond the 2012 *IECC* and *IRC*, provides incentives for good building practice and technologies, and gives jurisdictions an easily-adaptable, and easy to administer method to set ever-improving efficiency requirements.

The proposal lays the groundwork for future improvement in the code by establishing a structure for both prescriptive- and performance-based compliance options.

In order to maximize flexibility and prepare for future improvements to the code, this proposal establishes multiple methods of compliance for new buildings and additions of more than 1,000 square feet (smaller additions, alterations, renovations and repairs are currently proposed to be exempt to keep the proposal simpler).

- For code users who prefer a straightforward points-based approach to code compliance, Section R406 outlines a number of options for each climate zone that can be combined for a total of at least 5 points. Each point represents roughly a one percent decrease in the present value of energy costs over the life of the building (so 5 points equal roughly a 5% improvement in efficiency over the 2012 *IECC*).
- For code users who wish to use the simulated performance alternative in Section R405, the proposal also allows compliance where the proposed design demonstrates an energy cost less than or equal to 95% of the standard reference design. The proposal also allows compliance with the points system so long as the user does not "double count" in its performance analysis any improvements used in points compliance.
- Section R406 also creates a new option to demonstrate compliance through installation of renewable energy systems.

These compliance options can be easily updated in the future. For example, as additional technologies and building practices are improved in the future, these technologies can be added to the table, along with a corresponding point value, without a total rewrite of the code.
Points have been calculated based on the present value of energy cost savings over the current code (with recognition of relevant federal equipment standards), after reflecting the estimated useful life of each measure and an assumed 30-year life of the building for purposes of the analysis (consistent with a 30-year mortgage). This approach factors in the durability and useful life of each additional option chosen, recognizing that it is not the energy cost savings in the first year that is critical, but the cost savings over the life of the home that is most important. Although no building energy simulation on this scale will be perfect, the analysis behind the Flex Points tables is among the most sophisticated and detailed of its type. The analysis used the Department of Energy building analysis and present value calculation methodology, which will allow for easy updates to the table in the future. The analysis includes 105 TMY3 weather locations and 12 building types to account for varying stories, foundations and fuel types for each of the baseline and upgrade measures.

The proposal creates incentives for code users to consider installing high-efficiency heating, cooling, and water heating systems, as well as other alternatives, without degrading the thermal building envelope or violating federal law.

Code-writing organizations have long wrestled with the dilemma of how to incorporate high-efficiency heating, cooling, and water heating requirements into the code without violating federal law and without sacrificing improvements to the thermal envelope in return. In past code cycles, EECC was instrumental in removing the equipment trade-offs from the code to resolve the issues these trade-offs and the federal laws created. We remain strongly committed to that approach today. However, this proposal takes the next step by leaving the 2012 *IECC* baseline requirements intact, while offering code users the choice of equipment upgrades among several other potential improvements beyond the baseline requirements.
The proposal includes three Flex Points tables that correspond with current requirements and expected changes to HVAC equipment efficiency in the coming years. Although we hope to see improvements in federal efficiency standards for heating and cooling equipment take effect in the near future, it is not yet clear when (or in some cases if) new requirements that have been developed by U.S. DOE will actually become effective. It would not be appropriate to award “credit” for a measure already required by federal law. And U.S. DOE is working to replace national standards with regional-based standards that will vary from one region to the next.
The proposal addresses these complications in a relatively simple way. The point values in each table under Section R406 have been set according to the energy savings that would result based on a specific equipment efficiency baseline in all climate zones. The first table, Table R406(a), establishes a baseline set of the heating and cooling equipment efficiencies reflective of current efficiencies. When federal minimum efficiencies are increased for specific heating and/or cooling equipment, as is reflected under the latest federal rule, states will apply the appropriate table. The choice of tables will allow states to apply the appropriate Flex Points without recalculating the savings for each individual measure.

The proposal allows jurisdictions to “try out” a wide variety of efficiency measures that would be difficult to require as prescriptive requirements.

Innovative building practices or emerging technologies can benefit from being listed in state and local building codes. However, states may have difficulty prescriptively requiring new technologies or building practices for all homes that are not yet widely available. For example, ground-source heat pumps can offer significant energy savings, but because of geological features or regulatory issues, they may not be appropriate in all circumstances. The proposal above provides an incentive to consider installing a ground source heat pump as one of several compliance options under Section R406, but also offers many other comparable options or combinations of such options to achieve the same level of savings.
By incorporating several of these practices and technologies among the multiple options of Section R406, the proposal above essentially gives these emerging technologies and practices a foothold, and allows consumers and the market to determine the most feasible options for any given project. As emerging technologies become more mainstream, Section R406 may also be a good source for additional improvements to the prescriptive baseline in future code editions.

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

R401.2-EC-DEAN-HARRIS-MISURELLO-PRINDLE-STONEFNF-bd2(2).DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The point system in ICC700 is simple, and workable, but there is no justification that the stringency of this code is achieved. ICC 700 can be used as an above code program now, with appropriate analysis.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R401 (N1101)
GENERAL

R401.2 (IRC N1101.15) Compliance. Projects shall comply with Sections identified as "mandatory" and with either sections identified as "prescriptive" or the simulated performance alternative in Section R405. In addition, all projects shall comply with Section R406.

SECTION R406 (N1106)
ADDITIONAL ENERGY EFFICIENCY (MANDATORY)

R406.1 (N1106.1) Scope. This section establishes additional mandatory requirements applicable to all compliance approaches to achieve additional energy efficiency.

R406.2 (N1106.2) Points-based compliance. One or more energy efficiency measures shall be installed in accordance with Section R406.3 that cumulatively equal or exceed 5 Flex Points for the appropriate Climate Zone. Projects complying under the simulated performance alternative outlined in Section R405 shall demonstrate compliance with Section R405 without including in the proposed design any features that will be utilized to comply with Section R406.

Exceptions: The requirements of this section shall not apply to:

1. Projects complying under the performance approach outlined in Section R405, where the *proposed design* under Section R405.3 is shown to have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the *standard reference design.*
2. Projects with an on-site or building integrated renewable energy system installed that provides not less than 0.50 watts per square foot (5.4 W/m^2) of *conditioned floor area*.
3. Additions with a *conditioned floor area* equal to or less than 1,000 square feet.
4. *Alterations*, renovations and *repairs* to an existing building.

R406.3 (N1106.3) Flex Points for additional energy efficiency. Measures shall be selected from ~~the applicable Flex Points~~ Table R406.3.1~~based on the applicable federal minimum equipment efficiency established by federal rule for that state that applies to the specified heating and cooling equipment on the date that a permit is issued~~. Each measure chosen shall receive credit for the Flex Points as indicated in the ~~applicable~~ Table for the specific Climate Zone. Interpolation of points between measures shall not be permitted.

~~**R406.3.1 (N1106.3.1) Use of Flex Points Table R406.3.1.** In states where the applicable federal minimum efficiencies are less than or equal to 80 AFUE for non-weatherized gas residential furnaces, equal to 7.7 HSPF for split system heat pumps, and equal to 13 SEER for split system air conditioners, Table R406.3.1 shall be used.~~

~~**TABLE R406.3.1 (N1106.3.1)**~~
~~**FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY**~~

~~Measure Number~~	~~Measure Description~~	~~Flex Point Value~~								
		~~CZ 1~~	~~CZ 2~~	~~CZ 3~~	~~CZ 4~~	~~CZ 4C~~ [a]	~~CZ 5~~	~~CZ 6~~	~~CZ 7~~	~~CZ 8~~
~~1a~~	~~≥ 2.5% reduction in total UA~~ [b]	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~	~~3~~	~~4~~	~~4~~
~~1b~~	~~≥ 5% reduction in total UA~~ [b]	~~3~~	~~3~~	~~3~~	~~3~~	~~3~~	~~4~~	~~5~~	~~5~~	~~5~~
~~1c~~	~~≥ 7.5% reduction in total UA~~ [b]	~~5~~	~~5~~	~~5~~	~~5~~	~~5~~	~~6~~	~~7~~	~~8~~	~~8~~
~~1d~~	~~≥ 10% reduction in total UA~~ [b]	~~6~~	~~7~~	~~7~~	~~7~~	~~8~~	~~8~~	~~9~~	~~10~~	~~10~~
~~2a~~	~~≥ 10% reduction in glazed fenestration area-weighted average SHGC~~	~~2~~	~~1~~	-	-	-	-	-	-	-
~~2b~~	~~≥ 20% reduction in glazed fenestration area-weighted average SHGC~~	~~4~~	~~1~~	-	-	-	-	-	-	-
~~3a~~	~~≤ 4 ACH50 air leakage rate with ERV or HRV installed~~ [c]	~~1~~	~~2~~	-	-	-	-	-	-	-

~~3b~~	~~≤ 3 ACH50 air leakage rate with ERV or HRV installed~~ [c]	~~2~~	~~4~~	~~5~~	~~6~~	~~7~~	~~7~~	~~7~~	~~8~~	~~8~~
~~3c~~	~~≤ 2 ACH50 air leakage rate with ERV or HRV installed~~ [c]	~~2~~	~~5~~	~~7~~	~~9~~	~~9~~	~~9~~	~~10~~	~~11~~	~~11~~
~~4a~~	~~≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2~~	~~1~~	~~1~~	~~1~~	~~1~~	-	~~1~~	~~1~~	~~1~~	~~1~~
~~4b~~	~~100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~2~~	~~2~~	~~2~~
~~4c~~	~~100% of duct thermal distribution system located in *actively conditioned space*~~ [d]	~~8~~	~~8~~	~~9~~	~~11~~	~~8~~	~~12~~	~~15~~	~~17~~	~~17~~
~~4d~~	~~100% of ductless thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*~~ [d]	~~8~~	~~8~~	~~9~~	~~11~~	~~8~~	~~12~~	~~15~~	~~17~~	~~17~~
~~4e~~	~~100% of hydronic thermal distribution system located in *actively conditioned space*~~ [d]	~~8~~	~~8~~	~~9~~	~~11~~	~~8~~	~~12~~	~~15~~	~~17~~	~~17~~
~~5a~~	~~≥ 15 SEER and ≥ 12.5 EER cooling system efficiency~~ [e]	~~4~~	~~3~~	~~1~~	~~1~~	-	-	-	-	-
~~5b~~	~~≥ 16 SEER and ≥ 13 EER cooling system efficiency~~ [e]	~~7~~	~~5~~	~~2~~	~~1~~	-	-	-	-	-
~~5c~~	~~≥ 18 SEER and ≥ 14 EER cooling system efficiency~~ [e]	~~11~~	~~8~~	~~3~~	~~2~~	-	~~1~~	-	-	-
~~5d~~	~~≥ 16 EER cooling system efficiency~~ [e]	~~11~~	~~8~~	~~3~~	~~2~~	-	~~1~~	-	-	-
~~5e~~	~~≥ 18 EER cooling system efficiency~~ [e]	~~15~~	~~11~~	~~4~~	~~3~~	-	~~1~~	-	-	-
~~5f~~	~~≥ 20 EER cooling system efficiency~~ [e]	~~17~~	~~13~~	~~5~~	~~3~~	-	~~1~~	~~1~~	-	-
~~6a~~	~~≥ 90 AFUE heating system efficiency~~ [f]	-	~~1~~	~~4~~	~~6~~	~~6~~	~~7~~	~~7~~	~~8~~	~~9~~
~~6b~~	~~≥ 92 AFUE heating system efficiency~~ [f]	-	~~2~~	~~5~~	~~7~~	~~7~~	~~8~~	~~9~~	~~10~~	~~11~~
~~6c~~	~~≥ 95 AFUE heating system efficiency~~ [f]	-	~~2~~	~~6~~	~~8~~	~~9~~	~~10~~	~~11~~	~~12~~	~~13~~
~~6d~~	~~≥ 96 AFUE heating system efficiency~~ [f]	-	~~2~~	~~6~~	~~9~~	~~10~~	~~10~~	~~11~~	~~12~~	~~14~~
~~6e~~	~~≥ 98 AFUE heating system efficiency~~ [f]	-	~~3~~	~~7~~	~~10~~	~~11~~	~~12~~	~~13~~	~~14~~	~~15~~
~~7a~~	~~≥ 8.8 HSPF heating system efficiency~~ [f]	-	-	~~1~~	~~1~~	~~2~~	~~2~~	~~2~~	~~2~~	~~1~~
~~7b~~	~~≥ 9.5 HSPF heating system efficiency~~ [f]	-	~~1~~	~~2~~	~~3~~	~~3~~	~~4~~	~~4~~	~~4~~	~~3~~
~~7c~~	~~≥ 10.5 HSPF heating system efficiency~~ [f]	-	~~1~~	~~3~~	~~6~~	~~6~~	~~7~~	~~6~~	~~5~~	~~5~~
~~7d~~	~~≥ 3 COP heating system efficiency~~ [f]	-	~~1~~	~~3~~	~~5~~	~~5~~	~~6~~	~~5~~	~~5~~	~~4~~
~~7e~~	~~≥ 3.5 COP heating system efficiency~~ [f]	-	~~2~~	~~5~~	~~8~~	~~8~~	~~9~~	~~9~~	~~9~~	~~7~~
~~7f~~	~~≥ 4 COP heating system efficiency~~ [f]	-	~~3~~	~~6~~	~~10~~	~~10~~	~~12~~	~~11~~	~~10~~	~~8~~
~~8a~~	~~≥ 0.7 EF for fossil fuel service water heating system~~	-	-	-	-	-	-	-	-	-
~~8b~~	~~≥ 0.8 EF for fossil fuel service water heating system~~	~~4~~	~~3~~	~~3~~	~~2~~	~~2~~	~~2~~	~~1~~	~~1~~	~~1~~
~~8c~~	~~≥ 0.95 EF for electric service water heating system~~	-	-	-	-	-	-	-	-	-
~~8d~~	~~≥ 1.15 EF for electric service water heating system~~	~~7~~	~~7~~	~~7~~	~~4~~	~~5~~	~~3~~	~~3~~	~~2~~	~~1~~
~~8e~~	~~≥ 0.4 Solar Fraction for service water heating system~~	~~6~~	~~7~~	~~9~~	~~7~~	~~9~~	~~6~~	~~5~~	~~4~~	~~3~~

~~a. Climate Zone 4C is Climate Zone Marine 4.~~
~~b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.~~
~~c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).~~
~~d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.~~
~~e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.1 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.~~
~~f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.1 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.~~

~~**R406.3.2 (N1106.3.2) Use of Flex Points Table R406.3.2.**. In states where the applicable federal minimum efficiencies are less than or equal to 80 AFUE for non-weatherized gas residential furnaces, equal to 8.2 HSPF for split system heat pumps, and less than or equal to 14 SEER for split system air conditioners, Table R406.3.2 shall be used.~~

TABLE ~~R406.3.2 (N1106.3.2)~~ R406.3.1 (N1106.3.1)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	**Measure Description**	**Flex Point Value**								
		CZ 1	**CZ 2**	**CZ 3**	**CZ 4**	**CZ 4C** [a]	**CZ 5**	**CZ 6**	**CZ 7**	**CZ 8**
1a	≥ 2.5% reduction in total UA [b]	1	1	2	2	2	2	3	4	4
1b	≥ 5% reduction in total UA [b]	3	3	3	3	3	4	5	5	5
1c	≥ 7.5% reduction in total UA [b]	5	5	5	5	5	6	7	8	8
1d	≥ 10% reduction in total UA [b]	6	7	7	7	8	8	9	10	10
2a	≥ 10% reduction in glazed fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-
2b	≥ 20% reduction in glazed fenestration area-weighted average SHGC	4	1	-	-	-	-	-	-	-
3a	≤ 4 ACH50 air leakage rate with ERV or HRV installed [c]	1	2	-	-	-	-	-	-	-
3b	≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]	2	4	5	7	7	7	7	8	8
3c	≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]	2	5	7	9	9	9	10	11	11
4a	≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2	1	1	1	1	-	1	1	1	1
4b	100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*	1	1	1	1	1	1	2	2	2
4c	100% of duct thermal distribution system located in *actively conditioned space* [d]	8	8	9	11	8	12	15	17	17
4d	100% of ductless thermal distribution system located in *building thermal envelope* ~~*passively conditioned space* and/or *actively conditioned space* [d]~~	8	8	9	11	8	12	15	17	17
4e	100% of hydronic thermal distribution system located in *building thermal envelope* ~~*actively conditioned space* [d]~~	8	8	9	11	8	12	15	17	17
5a	≥ 15 SEER and ≥ 12.5 EER cooling system efficiency [e]	2	2	1	-	-	-	-	-	-
5b	≥ 16 SEER and ≥ 13 EER cooling system efficiency [e]	5	4	1	1	-	-	-	-	-
5c	≥ 18 SEER and ≥ 14 EER cooling system efficiency [e]	9	7	3	2	-	-	-	-	-
5d	≥ 16 EER cooling system efficiency [e]	10	7	3	2	-	-	-	-	-
5e	≥ 18 EER cooling system efficiency [e]	13	10	4	2	-	1	-	-	-
5f	≥ 20 EER cooling system efficiency [e]	16	12	5	3	-	1	-	-	-
6a	≥ 90 AFUE heating system efficiency [f]	-	2	4	6	6	7	8	8	9
6b	≥ 92 AFUE heating system efficiency [f]	-	2	5	7	7	8	9	10	11
6c	≥ 95 AFUE heating system efficiency [f]	-	2	6	8	9	10	11	12	13
6d	≥ 96 AFUE heating system efficiency [f]	-	2	6	9	10	10	11	12	14
6e	≥ 98 AFUE heating system efficiency [f]	-	3	7	10	11	12	13	14	15
7a	≥ 8.8 HSPF heating system efficiency [f]	-	-	-	-	-	-	-	-	-
7b	≥ 9.5 HSPF heating system efficiency [f]	-	-	1	2	2	2	2	2	1
7c	≥ 10.5 HSPF heating system efficiency [f]	-	1	2	4	4	5	4	3	3
7d	≥ 3 COP heating system efficiency [f]	-	1	2	3	3	4	3	3	2
7e	≥ 3.5 COP heating system efficiency [f]	-	2	4	6	6	8	7	6	5

7f	≥ 4 COP heating system efficiency [f]	-	2	5	8	9	10	10	9	7
8a	≥ 0.7 EF for fossil fuel service water heating system	2	2	-	-	-	-	-	-	-
8b	≥ 0.8 EF for fossil fuel service water heating system	7	5	4	3	2	2	2	1	1
8c	≥ 0.95 EF for electric service water heating system	-	-	-	-	-	-	-	-	-
8d	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2	2
8e	≥ 0.4 Solar Fraction for service water heating system	8	9	9	7	9	6	5	4	3

a. Climate Zone 4C is Climate Zone Marine 4.
b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.
c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).
d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts ~~or pipes~~ used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.
e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table ~~R406.3.2~~ R406.3.1 and shall be sized to serve 100 percent of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.
f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table ~~R406.3.2~~ R406.3.1 and shall be sized to serve 100 percent of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

~~**R406.3.3 (N1106.3.3) Use of Flex Points Table R406.3.3.** In states where the applicable federal minimum efficiencies are equal to 90 AFUE for non-weatherized gas residential furnaces, equal to 8.2 HSPF for split system heat pumps, and less than or equal to 14 SEER for split system air conditioners, Table R406.3.3 shall be used.~~

~~TABLE R406.3.3 (N1106.3.3)~~
~~FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY~~

~~Measure Number~~	~~Measure Description~~	~~Flex Point Value~~								
		~~CZ 1~~	~~CZ 2~~	~~CZ 3~~	~~CZ 4~~	~~CZ 4C [a]~~	~~CZ 5~~	~~CZ 6~~	~~CZ 7~~	~~CZ 8~~
~~1a~~	~~≥ 2.5% reduction in total UA [b]~~	~~1~~	~~1~~	~~2~~	~~2~~	~~2~~	~~2~~	~~3~~	~~4~~	~~4~~
~~1b~~	~~≥ 5% reduction in total UA [b]~~	~~3~~	~~3~~	~~3~~	~~3~~	~~3~~	~~4~~	~~4~~	~~5~~	~~5~~
~~1c~~	~~≥ 7.5% reduction in total UA [b]~~	~~4~~	~~5~~	~~5~~	~~5~~	~~5~~	~~6~~	~~7~~	~~8~~	~~8~~
~~1d~~	~~≥ 10% reduction in total UA [b]~~	~~6~~	~~7~~	~~7~~	~~7~~	~~7~~	~~8~~	~~9~~	~~10~~	~~10~~
~~2a~~	~~≥ 10% reduction in glazed fenestration area-weighted average SHGC~~	~~2~~	~~1~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~2b~~	~~≥ 20% reduction in glazed fenestration area-weighted average SHGC~~	~~4~~	~~2~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~3a~~	~~≤ 4 ACH50 air leakage rate with ERV or HRV installed [c]~~	~~1~~	~~2~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~3b~~	~~≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]~~	~~2~~	~~4~~	~~5~~	~~6~~	~~7~~	~~7~~	~~7~~	~~8~~	~~8~~
~~3c~~	~~≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]~~	~~2~~	~~5~~	~~7~~	~~9~~	~~9~~	~~9~~	~~10~~	~~11~~	~~11~~
~~4a~~	~~≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2~~	~~1~~	~~1~~	~~1~~	~~1~~	~~-~~	~~1~~	~~1~~	~~1~~	~~1~~
~~4b~~	~~100% of duct thermal distribution system located in *passively conditioned space* and/or *actively conditioned space*~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~2~~	~~2~~	~~2~~
~~4c~~	~~100% of duct thermal distribution system located in *actively conditioned space* [d]~~	~~8~~	~~8~~	~~9~~	~~10~~	~~8~~	~~12~~	~~15~~	~~17~~	~~17~~
~~4d~~	~~100% of ductless thermal distribution system located in *passively conditioned space* and/or *actively conditioned space* [d]~~	~~8~~	~~8~~	~~9~~	~~10~~	~~8~~	~~12~~	~~15~~	~~17~~	~~17~~
~~4e~~	~~100% of hydronic thermal distribution system located in *actively conditioned space* [d]~~	~~8~~	~~8~~	~~9~~	~~10~~	~~8~~	~~12~~	~~15~~	~~17~~	~~17~~

~~5a~~	~~≥ 15 SEER and ≥ 12.5 EER cooling system efficiency~~ [e]	~~2~~	~~2~~	~~1~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~5b~~	~~≥ 16 SEER and ≥ 13 EER cooling system efficiency~~ [e]	~~5~~	~~4~~	~~1~~	~~1~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~5c~~	~~≥ 18 SEER and ≥ 14 EER cooling system efficiency~~ [e]	~~9~~	~~7~~	~~3~~	~~2~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~5d~~	~~≥ 16 EER cooling system efficiency~~ [e]	~~10~~	~~7~~	~~3~~	~~2~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~5e~~	~~≥ 18 EER cooling system efficiency~~ [e]	~~13~~	~~10~~	~~4~~	~~2~~	~~-~~	~~1~~	~~-~~	~~-~~	~~-~~
~~5f~~	~~≥ 20 EER cooling system efficiency~~ [e]	~~16~~	~~12~~	~~5~~	~~3~~	~~-~~	~~1~~	~~-~~	~~-~~	~~-~~
~~6a~~	~~≥ 90 AFUE heating system efficiency~~ [f]	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~6b~~	~~≥ 92 AFUE heating system efficiency~~ [f]	~~-~~	~~-~~	~~-~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~
~~6c~~	~~≥ 95 AFUE heating system efficiency~~ [f]	~~-~~	~~-~~	~~2~~	~~2~~	~~3~~	~~3~~	~~3~~	~~4~~	~~4~~
~~6d~~	~~≥ 96 AFUE heating system efficiency~~ [f]	~~-~~	~~1~~	~~2~~	~~3~~	~~3~~	~~4~~	~~4~~	~~4~~	~~5~~
~~6e~~	~~≥ 98 AFUE heating system efficiency~~ [f]	~~-~~	~~1~~	~~3~~	~~4~~	~~4~~	~~5~~	~~5~~	~~6~~	~~6~~
~~7a~~	~~≥ 8.8 HSPF heating system efficiency~~ [f]	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~7b~~	~~≥ 9.5 HSPF heating system efficiency~~ [f]	~~-~~	~~-~~	~~1~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~	~~1~~
~~7c~~	~~≥ 10.5 HSPF heating system efficiency~~ [f]	~~-~~	~~1~~	~~2~~	~~4~~	~~4~~	~~5~~	~~4~~	~~3~~	~~3~~
~~7d~~	~~≥ 3 COP heating system efficiency~~ [f]	~~-~~	~~1~~	~~2~~	~~3~~	~~3~~	~~4~~	~~3~~	~~3~~	~~2~~
~~7e~~	~~≥ 3.5 COP heating system efficiency~~ [f]	~~-~~	~~2~~	~~4~~	~~6~~	~~6~~	~~8~~	~~7~~	~~6~~	~~5~~
~~7f~~	~~≥ 4 COP heating system efficiency~~ [f]	~~-~~	~~2~~	~~5~~	~~8~~	~~9~~	~~10~~	~~10~~	~~9~~	~~7~~
~~8a~~	~~≥ 0.7 EF for fossil fuel service water heating system~~	~~2~~	~~2~~	~~1~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~8b~~	~~≥ 0.8 EF for fossil fuel service water heating system~~	~~7~~	~~5~~	~~4~~	~~3~~	~~2~~	~~2~~	~~2~~	~~1~~	~~1~~
~~8c~~	~~≥ 0.95 EF for electric service water heating system~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~
~~8d~~	~~≥ 1.15 EF for electric service water heating system~~	~~7~~	~~7~~	~~7~~	~~4~~	~~5~~	~~3~~	~~3~~	~~2~~	~~1~~
~~8e~~	~~≥ 0.4 Solar Fraction for service water heating system~~	~~8~~	~~9~~	~~9~~	~~7~~	~~9~~	~~6~~	~~5~~	~~4~~	~~3~~

~~a. Climate Zone 4C is Climate Zone Marine 4.~~
~~b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.~~
~~c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).~~
~~d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.~~
~~e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.3 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.~~
~~f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.3 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.~~

SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

CONDITIONED SPACE. An area within a building that is either *actively conditioned space* or *passively conditioned space*.

ACTIVELY CONDITIONED SPACE. An area within a *building thermal envelope* that is directly heated or cooled, including any habitable room.

PASSIVELY CONDITIONED SPACE. An area within a *building thermal envelope* that is not directly heated or cooled, including wall cavities, floor cavities, ceiling cavities, storage rooms, closets, non-habitable attic, non-habitable basement, crawlspace, spaces or cavities that contain uninsulated ducts or thermal distribution systems or have an opening directly into an adjacent conditioned space.

Commenter's Reason: We recommend approval of RE186 as modified by this public comment. The original reason statement for RE186 offers a comprehensive set of reasons why a points-based set of options provides maximum flexibility, while also improving the efficiency of the IECC by about 5%. As a result, we need not reiterate the reasons in this public comment.

However, based on the residential energy committee's reason statement, as well as misinformation raised in testimony by various stakeholders, we submit the following clarifications and further explanation:

- The residential energy committee's reason for recommending disapproval appears to reflect a mistaken understanding of this proposal. The EECC is not proposing to adopt ICC-700 or anything like it. In fact, we opposed incorporation of ICC-700 into the IECC in another code proposal (CE34).
- The "Flex Points" proposal is not an "above-code" program. Rather it is an additional efficiency requirement with the choice among a number of compliance options. The IECC commercial provisions already have a similar approach (see section C406).
- RE186 improves the 2012 IECC by 5% in two ways:
  - Homes can be built to the performance path and show an annual energy usage of no more than 95% of the standard reference design.
  - Homes can be built to the prescriptive or Total UA paths and show that they have installed sufficient additional energy efficiency measures to equal at least 5 Flex Points from the table column appropriate to the jurisdiction.
- For many builders, there will be no cost increase whatsoever, since many of the Flex Points options are commonly installed -- such as improved HVAC equipment or ducts located indoors – and can satisfy all 5 flex points (or more).
- The flex points measures in most cases are not appropriate to require in the base code, either because of federal preemption issues or a lack of market penetration for new efficient products.
- As indicated in our original reason statement, the analysis is based on the Department of Energy Methodology for Evaluated Cost-Effectiveness of Residential Energy Code Changes and the present value calculation methodology, which will allow for easy updates to the table in the future. The analysis first uses a present value analysis over a 30-year useful life of the building to determine the present value of energy cost savings for each measure – specifically, the analysis calculates the energy savings on a present value basis for the estimated life of each measure up to 30 years. Then the estimate of energy savings is converted into points for each measure. Each point is equal to the present value of 1% energy savings over 20 years; by using a 20 year benchmark, the points allow more flexibility among measures and provide some greater recognition to those measures with longer useful lives. While some measures have a longer life than 30 years, using a 30-year useful life ensures that savings are capped at a commonly used 30-year metric for homes, such as a typical 30 year mortgage, which is conservatively low for measures that last for the entire lifetime of the home.

In this public comment, we propose limited modifications to the original proposal to further simplify it. Most importantly we have deleted two of the tables as no longer necessary and modified the companion language accordingly. These changes will make application of the table simpler. The original three tables with options were necessary due to uncertainty regarding federal minimum equipment efficiencies when the proposal was in the process of preparation. At this point, minimum equipment requirements in 2015 are clear, requiring only one table that will apply nationwide.

No other proposal before the Governmental Members will produce an additional 5% savings from all residential buildings subject to the code, with the level of flexibility allowed by RE186. We urge approval of RE186 as modified.

RE186-13

Final Action: AS AM AMPC____ D

RE188-13
R202 (NEW) (IRC N1101.9 (NEW)), R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 NEW)

Proposed Change as Submitted

Proponent: Eric Makela, Britt Makela Group, Inc., David Goldstein, National Resource Defense Council (Eric@BrittMakela.com)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as “mandatory” and with either sections identified as “prescriptive”, ~~or~~ the performance approach in Section R405~~.~~ or an Energy Rating Index (ERI) approach in Section R406.

SECTION R406 (N1106)
ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

R406.1 (N1106.1) Scope. This section establishes criteria for compliance using an Energy Rating Index analysis.

R406.2 (N1106.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 and R403.4.2 be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the 2009 *International Energy Conservation Code.*

> **Exception:** Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

R406.3 (N1106.3) Energy rating index. The energy rating index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a residential building that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a one percent (1%) change in the total energy use of the *rated design* relative to the total energy use of the *ERI reference design*. The ERI shall consider all energy used in the residential building.

R406.3.1 (N1106.3.1) ERI reference design. The *ERI reference design* shall be configured such that is it meets the minimum requirements of the 2006 *International Energy Conservation Code* prescriptive requirements

The proposed residential building shall be shown to have an annual total normalized Modified Loads that are less than or equal to the annual total Loads of the *ERI reference design.*

R406.4 (N1106.4) ERI based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.3, when compared to the *ERI reference design*.

TABLE R406.4 (N1106.4)
MAXIMUM ENERGY RATING INDEX

Climate Zone	Energy Rating Index
1	52
2	52
3	51
4	54
5	55
6	54
7	53
8	53

R406.5 (N1106.5) Verification by approved agency. Verification of compliance with Section R406 shall be completed by an *approved* third party.

R406.6 (N1106.6) Documentation. Documentation of the software used to determine the energy rating index and the parameters for the residential building shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official.*

R406.6.2 (N1106.6.2) Compliance report. Compliance software tools shall generate a report that documents that the energy rating index of the *rated design* complies with Sections R406.3 and R406.4. The compliance documentation shall include the following information:

1. Address or other identification of the residential building;
2. An inspection checklist documenting the building component characteristics of the *rated design*. The inspection checklist shall show results for both the *ERI reference design* and the *rated design,* and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

Exception: Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations.

R406.6.3 (N1106.6.3) Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *ERI reference design.*
2. A certification signed by the builder providing the building component characteristics of the *rated design.*
3. Documentation of the actual values used in the software calculations for the *rated design.*

R406.7 (N1106.7) Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.7.1through R406.7.3.

R406.7.1 (N1106.7.1)Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the energy rating index as described in Section R406.3, and shall include the following capabilities:

1. Computer generation of the *ERI reference design* using only the input for the *rated design.*

The calculation procedure shall not allow the user to directly modify the building component characteristics of the *ERI reference design.*

2. Calculation of whole-building, as a single *zone,* sizing for the heating and cooling equipment in the *ERI reference design* residence in accordance with Section R403.6.

3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.

4. Printed *code official* inspection checklist listing each of the *rated design* component characteristics determined by the analysis to provide compliance, along with their respective performance ratings.

R406.7.2 (N1106.7.2) Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be *approved.* Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall approve tools for a specified application or limited scope.

R406.7.3 (N1106.7.3) Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an *approved* source.

Add new definitions as follows:

RATED DESIGN. A description of the proposed building used to determine the energy rating index.

ERI REFERENCE DESIGN. A version of the *rated design* that meets the minimum requirements of the 2006 *International Energy Conservation Code.*

Reason: The residential provisions of the IECC allows for varying methods for demonstrating compliance with the code. This includes both a prescriptive and simulated performance option in addition to allowing efficiency programs that are designed to go above the minimum code levels as “deemed to comply” programs. These above code programs must be approved by the code official to be used in the jurisdiction. Alternative programs that depend on an Energy Rating Index (ERI) have been approved as an alternative code or above code program in at least 6 states and in over 130 jurisdictions. These types of programs typically take the form of a Home Energy Rating System (HERS) program. Under the current code there is no guidance on setting Energy Rating Index scores, which will lead to inconsistent application of these types of programs based on climate zones.

The goal of this proposal is to introduce an Energy Rating Index with established rating numbers into the code that will allow alternative programs to be designed to meet these criteria. The proposal provides guidelines for the development of the index, documentation provided to ensure compliance and a requirement that an approved 3rd party verify that the building complies with the applicable Energy Rating Index. The reference house is based on a home built to the 2006 IECC which is consistent with ERI based programs.

The 2009 IECC residential envelope requirements have been set as the least efficient level of efficiency for potential trade-offs to ensure that minimum levels of efficiency that have proven to be cost effective are installed in all buildings and that some flexibility is allowed in the approach to alternative designs. This proposal also requires complying with the applicable mandatory requirements to be consistent with the Above Code section in the IECC. And because energy losses in the domestic hot water distribution system fall outside the scope of the energy rating index as it can be calculated with 2013 methodology, current code provisions relating to hot water pipe insulation are mandatory as well. We anticipate that these requirements can be folded into the energy rating index for the 2018 IECC and thus removed from the mandatory sections then.

This proposal is intended to produce substantial additional energy savings compared to the current or proposed levels of prescriptive requirements in the 2015 IECC while allowing considerably greater flexibility to builders using a method with which a large segment of the market is already familiar. This flexibility is likely to result in lower construction costs for any given level of energy efficiency. Builders who do not make use of this proposed method are still able to comply with the Code can still use any of the existing compliance pathways.

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

R401.2-EC-GOLDSTEIN-MAKELA.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal, while providing 20% more stringency, provides a system that has considerably more flexibilitty for achieving energy efficiency. Rating systems are becoming a more common approach, with straightforward options that are being more widely used in the construction marketplace.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R406.2 (N1106.2) Mandatory requirements. Compliance with this section also requires that sections identified as ~~the~~ "mandatory" in this chapter be met and that ~~provisions identified in Section R401.2 and R403.4.2 be met. The~~ the building thermal envelope shall ~~be greater than or equal to levels of efficiency~~ meet the prescriptive requirements of Section R402.1 of this code. ~~and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the 2009 International Energy Conservation Code.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason: We recommend that RE188 be modified in accordance with this public comment. This public comment does not address the specifics of the proposed new home energy rating compliance approach, but instead focuses on creating reasonable assurance that homes using the new method will install a reasonable thermal envelope. Although we recognize the efforts of the proponents to attempt to establish effective limitations on the ability to trade away the efficiency of the permanent thermal envelope for shorter-lived equipment and appliances under a home energy rating approach, we are concerned that the original proposal still has the potential to give away too much long-term energy efficiency. The permanent prescriptive thermal envelope of the 2012 IECC is considerably more robust than the 2009 IECC. Although the proposed home energy rating method includes thermal envelope components in its calculation, several other components are also part of the equation that are not currently allowed under the IECC. Using the proposed home energy rating method, builders may take credits for equipment, appliances, lighting and a different performance baseline, potentially leading to homes built with less-efficient thermal envelopes and more efficient short-lived products. As a result, we believe that there needs to be a better backstop in this proposal to avoid undoing the progress made in improving the permanent thermal envelope in the 2012 IECC.

The modification proposed above attempts to strike a balance between efficiency and flexibility. The modification updates the reference to minimum thermal performance (prescriptive R-values, U-factors and SHGCs) to the current IECC requirements (section R402.1) instead of the 2009 IECC, but the modification allows all prescriptive options for demonstrating compliance with the thermal envelope prescriptive requirements (including Total UA). This will allow builders the most flexibility in demonstrating that the thermal envelope meets or exceeds the 2012 IECC, while avoiding an unnecessary weakening of the thermal envelope requirements of the current code through equipment, appliance and other trade-offs.

Public Comment 2:

Eric Makela, Britt/Makela Group, representing self, Ron Burton, representing Leading Builders of America, David Goldstein, representing National Resource Defense Council, and Meg Waltner, representing National Resource Defense Council, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R406.4 ERI based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.3, when compared to the *ERI reference design*.

Table R406.4 Maximum Energy Rating Index

Climate Zone	Energy Rating Index
1	~~52~~ 59
2	~~52~~ 59
3	~~51~~ 59
4	~~54~~ 63
5	~~55~~ 63
6	~~54~~ 62
7	~~53~~ 60
8	~~53~~ 60

(Portions of proposal not shown remain unchanged)

Public Comment 3:

Ryan Meres, Institute for Market Transformation, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

ERI REFERENCE DESIGN. A version of the *rated design* that meets the minimum requirements of Tables 404.5.2(1) and 404.5.2(2) of the 2006 International Energy Conservation Code.

SECTION R406
ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

R406.1 Scope. This section establishes criteria for compliance using an Energy Rating Index analysis.

R406.2 Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 and the provisions identified in Section R403.4.2 be met. The building thermal envelope shall be greater than or equal to levels of efficiency ~~and Solar Heat Gain Coefficient~~ in Table 402.1.1 or 402.1.3 of the 2009 International Energy Conservation Code. Solar Heat Gain Coefficient shall be no greater than the levels in Table 402.1.1 of the 2009 International Energy Conservation Code.

Exceptions:

1. All supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

R406.3 Energy Rating Index. The ERI shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a home that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a one percent (1%) change in the total energy use of the *rated design* relative to the total energy use of the *ERI reference design*. ~~The ERI shall consider all energy used in the dwelling unit.~~ The ERI shall consider all energy loads used in the dwelling unit as regulated by the provisions of this code including lighting and plug loads installed at the time of final inspection.

~~**R406.3.1 ERI Reference Design.** The *ERI reference design* shall be configured such that is it meets the minimum requirements of the 2006 International Energy Conservation Code prescriptive requirements~~
~~The proposed residence shall be shown to have an annual total normalized Modified Loads that are less than or equal to the annual total Loads of the *ERI reference design.*~~

R406.4 ERI based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.3, when compared to the *ERI reference design*.

Table R406.4 Maximum Energy Rating Index

Climate Zone	Energy Rating Index
1	52
2	52
3	51
4	54
5	55
6	54
7	53
8	53

R406.4 Verification by approved agency. Verification of compliance with Section R406 shall be completed by an *approved* third party.

<u>**R406.4.1 Equipment and device verification.** The efficiency of the equipment and devices used for the proposed design shall be specified in the construction documents. The equipment or device efficiency shall be readily observable for inspection after the equipment or device is installed.</u>

R406.5 Documentation. Documentation of the software used to determine the energy rating index and the parameters for the building shall be in accordance with Sections R406.5.1through R406.5.3.

R406.5.1 Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official.*

R406.5.2 Compliance report. Compliance software tools shall generate a report that documents that the energy rating index of the *rated design* complies with Sections R406.3 and R406.4. The compliance documentation shall include the following information:

1. Address or other identification of the residence;
2. An inspection checklist documenting the building component characteristics of the *rated design*. The inspection checklist shall show results for both the *ERI reference design* and the *rated design,* and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

Exception: Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations.

R406.5.3 Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *ERI reference design.*
2. A certification signed by the builder providing the building component characteristics of the *rated design.*
3. Documentation of the actual values used in the software calculations for the *rated design.*

R406.6 Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.6.1through R406.6.3.

R406.6.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the energy rating index as described in Section R406.3, and shall include the following capabilities:

1. Computer generation of the *ERI reference design* using only the input for the *rated design.* The calculation procedure shall not allow the user to directly modify the building component characteristics of the *ERI reference design.*

2. Calculation of whole-building (as a single *zone)* sizing for the heating and cooling equipment in the *ERI reference design* residence in accordance with Section R403.6.

3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.

4. Printed *code official* inspection checklist listing each of the *rated design* component characteristics determined by the analysis to provide compliance, along with their respective performance ratings.

5. <u>Calculations that account for the differences in the heating, cooling and hot water equipment efficiencies of the *reference design* and the *proposed design, and* normalize for the differences in fuel types.</u>

R406.6.2 Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be *approved.* Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *authority having jurisdiction* shall approve tools for a specified application or limited scope.

R406.6.3 Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an *approved* source.

(Portions of proposed change not shown remain unchanged.)

Commenter's Reason: This Public Comment addresses some of the issues that were raised at the IECC Code Development Hearings and also input from key stakeholders. The public comment clarifies the language. It specifically accounts for all energy using features in the building as long as the feature is present and installed at the time of final inspection.

Alternative programs that depend on an Energy Rating Index (ERI) have been approved as an alternative code or above code program in at least 6 states and in over 130 jurisdictions. These types of programs typically take the form of a Home Energy Rating

System (HERS) program. Under the current code there is no guidance on setting Energy Rating Index scores, which will lead to inconsistent application of these types of programs based on climate zones.

The goal of this proposal is to introduce an Energy Rating Index with established rating numbers into the code that will allow alternative programs to be designed to meet these criteria. The proposal provides guidelines for the development of the index, documentation provided to ensure compliance and a requirement that an approved 3rd party verify that the building complies with the applicable Energy Rating Index. The reference house is based on a home built to the 2006 IECC which is consistent with ERI based programs.

The 2009 IECC residential envelope requirements have been set as the least efficient level of efficiency for potential trade-offs to ensure that minimum levels of efficiency that have proven to be cost effective are installed in all buildings and that some flexibility is allowed in the approach to alternative designs. This proposal also requires complying with the applicable mandatory requirements to be consistent with the Above Code section in the IECC. And because energy losses in the domestic hot water distribution system fall outside the scope of the energy rating index as it can be calculated with 2013 methodology, current code provisions relating to hot water pipe insulation are mandatory as well.

This proposal is intended to produce substantial additional energy savings compared to the current or proposed levels of prescriptive requirements in the 2015 IECC while allowing considerably greater flexibility to builders using a method with which a large segment of the market is already familiar. This flexibility is likely to result in lower construction costs for any given level of energy efficiency. Builders who do not make use of this proposed method are still able to comply with the Code can still use any of the existing compliance pathways.

The IECC Code Development committee had this to say about RE-188: "This proposal, while providing 20% more stringency, provides a system that has considerably more flexibility for achieving energy efficiency. Rating systems are becoming a more common approach, with straightforward options that are being more widely used in the construction marketplace."

Public Comment 4:

Craig Conner, Building Quality, representing self, requests Disapproval.

Commenter's reason:

(Conner): The reason statement makes it clear that the proponents are trying to promote alternative programs for code compliance, a worthy goal. I think we are all strongly in favor of enabling alternative programs / above-code programs to be used for code compliance. However, this proposal is vague, inconsistent, and too close to proprietary. Moreover, it has restrictions that are not justified, nor has the selection of the specific "energy reference index" values been justified.

This proposal attempts to regulate or at least include ""*all energy used in the residential building*" (new R406.3). How does one regulate appliances that may not even be present at the time of inspection? What would be the minimum energy efficiency for the nonexistent appliances? How does one regulate what is just plugged into the wall?

There is no analysis supporting the specific numbers in the new table titled "Maximum Energy Rating Index". Those values are the core of this proposal and the values appear to be arbitrary.

A specific HERS score is not an accurate predictor of code compliance. EPA and DOE reached a similar conclusion for the Energy Star and Builder's Challenge programs. Neither uses a specific HERS score for a climate zone. EPA said "Given a constant set of energy efficiency features, these design features can alter the HERS index up to several points for individual factors and greater than 15 points by combining several factors into configurations often encountered in the real world."[1] A summary of this EPA analysis is available.[2] The Energy Star response was to require that a HERS score be recomputed for every building, and not to allow the same score for specific climate zones.[3] Likewise DOE requires a HERS score to be recomputed to each residence and does not allow a single HERS score for a whole climate zone.[4]

The stated goal of this proposal is flexibility; however in some ways this code change proposes the opposite of flexibly. This proposal places restrictions on insulation levels and glazing based on not allowing tradeoffs below the levels in the 2009 IECC (new R406.2). In some cases the 2009 and 2012 have the same requirement, so that tradeoff is not allowed at all. Nowhere are those specific restrictions justified through data or analysis. Comparing the 2012 and 2009 IECC shows tradeoffs that would not be allowed. In Zone 1 insulation is not tradable, as the 2009 and 2012 are the same. Floor insulation could only be traded in zone 5. Basement wall insulation is tradable only in Zone 5? Why? What makes insulation tradeoffs for basements and floors very bad? The 2009 IECC itself would allow those same tradeoffs, made up somewhere else, based on UA calculations or its own performance path.

The Energy Rating Index is not defined in a usable or easily understood manner. Unreasonable restrictions are included. For example, why require (not allow, but require) a 100 to 0 decreasing scale? Why would other scales not be allowed if they demonstrated compliance? Examples of other scales:
--DOE has a Home Energy Score that goes from 1 to 10, with10 the best.[5]
--ICC's "National Green Building Standard" (ICC 700-2012) has points. Higher is better. 120 energy points is very good and not easy to get. 10 points would be a terrible home.
--The Energy Performance Score goes from 0 to at least 200.[6]

In the sentence "The ERI shall consider all energy used in the residential building." What does "consider" mean? "Consider" is not a good word for the I-codes.

It is odd to reference the 2006 IECC (new R406.3.1) and the 2009 IECC (new R406.2) in the 2015 IECC. If there are limitations on the 2018 IECC based on values from previous versions of the IECC, those limitations should be included in the 2015 code so that it becomes a standalone code.

The term "normalized Modified Loads" is not defined or explained (new R06.3.1). There are no calculations specified. It is not a term in common use. IECC Section R201.4 says "terms not defined … shall have ordinarily accepted meanings such as the context implies." In an energy context "normalized" most commonly refers to heating and cooling energy that is normalized for weather variation. The proposal also used the word "Modified". How and why are the loads modified? This change covers "*all* *energy used in the residential building*". How are "normalized" and "modified" applied to the lighting, or appliances not specifically named in the IECC (dishwasher, refrigerator, etc.). And how is what are usually called "*plug loads*" to be "*normalized*" or "*modified*"?

In using the term "*normalized Modified Loads*" the proponents appear to be attempting to reference something used by RESNET in its home energy ratings. If this is correct, they have named a different form of the adjustment or at least incorrectly named it. Do they mean the "*normalized Modified End Use Loads*"?[7] No other alternative program or above code program I can find uses this "normalized Modified Loads" or "normalized Modified End Use Loads".

As worded, this change is proprietary. Requiring a 0 to 100 decreasing metric and a "normalized Modified Load" (assuming the name was corrected) results in only one group's product meeting this criteria. That group is RESNET. We should avoid even the appearance of proprietary systems in the I-Codes. . There are many other programs, both local and national, and the code should not promote just one of them, picked arbitrarily by the proponents.

If somehow referencing HERS in the code is the goal, or one of the goals, the proponents should at least wait until RESNET completes its ANSI consensus review process. RESNET does not yet have any ANSI approved documents that could be referenced. Or the proponents could work through some part of the Chapter 1 alternative programs ("above code programs") process.

References:
1. Overview of Evolving ENERGY STAR Qualified Homes Program & Methodology for Estimating Savings. See page 4, key feature #4.
http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/2011_Technical_Background.pdf
2. EPA Response to RESNET's Comments on the Proposed ENERGY STAR 2011 Qualified New Homes Guidelines
https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/EPA_Response_to_RESNET.pdf
3. ENERGY STAR Qualified Homes, Version 3 (Rev. 03) HERS Index Target Procedure For National Program Requirements
http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/V3HERS_IndexTargetProcedure.pdf
4. DOE Challenge Home HERS Index Target Procedure for National Home Requirements, April 1, 2012
http://www2.eere.energy.gov/buildings/residential/pdfs/challenge_home_hers_target_4-12.pdf
5. Home Energy Score
http://www1.eere.energy.gov/buildings/residential/hes_index.html
6. Energy Performance Score
http://energytrust.org/residential/new-home-solutions/eps.aspx
7. RESNET Mortgage Industry National HERS Standards. See page 3-3, equation 1.
http://www.resnet.us/standards/RESNET_Mortgage_Industry_National_HERS_Standards.pdf

Public Comment 5:

Neil Leslie, Gas Technology Institute, representing self, requests Disapproval.

Commenter's reason: RE188-13 is incomplete and unenforceable because it does not provide citable standards necessary for proper implementation and enforcement. Specifically, RE188-13 requires that "The proposed residential building shall be shown to have an annual total normalized Modified Loads that are less than or equal to the annual total Loads of the ERI reference design." Yet there is no guidance on how to determine the normalized modified loads. For this reason alone, RE188-13 should be disapproved.

Despite the lack of guidance on normalized modified load calculations in RE188-13, it is nearly certain that the proposal intends to use the RESNET normalized modified end use loads (nMEUL) methodology fully detailed in BSR/RESNET 301-2013 "Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using the HERS Index." Assuming this is the basis of the compliance requirement, RE188-13 must be disapproved due the **technical flaws and biases** embodied in the RESNET nMEUL methodology.

Unfortunately for the code official, the technical flaws and biases embodied in RE188 are hidden from view. The flaws are in the "black box" that code officials are being asked to accept as an alternative compliance mechanism to the energy code requirements. For brevity, this reason statement will focus on ONE technical flaw (and subsequent biases) that should more than justify disapproval of RE188-13 by building officials.

First, the nMEUL methodology utilizes **separate, inequitable reference home configurations and requirements** for all-electric homes compared to homes that also use fossil fuels. This hurts homebuyers, home builders, and many others in that it ignores fuel-specific efficiency benefits by having different base cases depending on what fuel is used for heating, air conditioning and hot water. **This means a different set of rules depending on fuel source.** This is technically wrong and sends grossly inaccurate signals to the marketplace on ratings and fuel choices. It also puts the code official in the very awkward position of hoping that some rating number actually meets the requirements and intent of the code.

The rating methodology also contains biased normalized gas efficiency improvement potentials relative to the "baseline" electricity efficiency improvement potential for heating and water heating (but not cooling) appliances. A good example of this key technical deficiency in the nMEUL rating method is its treatment of the reference electric heating and water heating technologies as equivalent to natural gas technologies from a home energy performance rating perspective, even though their primary energy efficiencies (as well as consumer cost and associated greenhouse gas emissions) are significantly different. The authors of the nMEUL methodology acknowledge this inequitable treatment and attempt to address it for higher efficiency options based on available market "potential" for efficiency improvement. As a result, the nMEUL method gives excess credit to higher efficiency natural gas heating and water heating options (but not gas cooling) relative to the gas reference design.

A simple example will show these points. Homes using NAECA minimum efficiency electric resistance storage water heating receive an identical HERS score as a NAECA minimum gas storage water heater, even though both the annual energy costs and primary energy consumption are much higher for the resistance water heater than for the gas water heater (typically twice as high). This "separate but equivalent" bias was never fixed in the nMEUL methodology as it was rolled out in the RESNET programs. The other bias negatively and disproportionately affects fossil fuel appliances at conventional efficiency levels, but the normalizing biases favor ultra-high efficiency gas technologies (such as gas heat pumps) at the expense of equivalent electric technologies.

So this isn't about gas versus electricity. It is about a single reference building where all constructions and fuels can be equally and equitably compared. It is about technical flaws in the "black box". It is about putting code officials at risk, along with builders and buyers, who want assurance of energy code compliance on a level playing field. **RE188 fails these most basic code equity requirements. Disapprove RE188.**

Public Comment 6:

Steve Rosenstock, representing Edison Electric Institute, requests Disapproval.

Commenter's reason: This proposal should be disapproved for the following reasons:

-It is a "backdoor" attempt to allow the use of HERS as a compliance path. In other actions, the code development committee specifically voted against the use of HERS as a compliance path. Disapproval would be consistent with the other committee actions.

-There is no information about the costs or energy savings to obtain an "ERI" of 51-55, depending on the climate zone.

-Under this alternative, a building that uses "no net purchased energy has an index of 0". As a result, a building could use 5 or 10 or 20 times the amount of energy of another building (that is much more energy efficient) as long as it has enough on-site renewable energy to "net out" the energy purchased from the grid. This type of credit for on-site renewable energy will not lead to more energy efficient homes, especially if the prices of renewable energy systems keep dropping at a dramatic pace. Energy production is not the same as energy efficiency, and building codes should not mix them together.

RE188-13
Final Action: AS AM AMPC____ D

RE190-13
R406 (New) (IRC N1106 (New))

Proposed Change as Submitted

Proponent: Robby Schwarz, EnergyLogic Inc., Representing EnergyLogic, Inc. (robby@nrglogic.com)

Add new text as follows:

SECTION R406 (N1106)
SIMULATED PERFORMANCE BY
INDEX SCORE METHOD
(PERFORMANCE)

R406.1 (N1106.1) Scope. The simulated performance index score method in Section R406 shall be used for determining that a building complies with this code. Such methods shall include a whole house energy analysis resulting in comparative index scores.

R406.2 (N1106.2) Mandatory requirements. Use of the simulated performance index score alternative method for compliance to this code shall require all of the following:

1. Design and construction of the building in compliance with sections in this code that are indicated as mandatory.
2. Inspections, required for the generation of an index score, are performed including, but not limited to, inspection, by the entity or person performing the energy analysis, of insulation systems and air barriers prior to concealment.
3. Supply and return ducts not completely inside the *building thermal envelope* are insulated with not less than an *R-value* of R-8.
4. Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, which ever is less.

R406.3 (N1106.3) Performance-based compliance. The proposed building (*proposed design*) shall be complaint witht his code where the index score generated by the energy analysis is less than or equal to the index score of the *standard reference design*. The *standard reference design* index score shall be determined by analyzing a building of identical geometry to the proposed building that has the features indicated in the *standard reference design* column of Table R405.5.2(1). The index score of the proposed design shall be calculated in accordance with RESNET Standards.

R406.3.1 (N1106.3.1) Compliance software tools. Software tools used to determine code compliance by the simulated performance index score method shall be accredited by the Residential Energy Services Network organization. Documentation showing the software accreditation shall be provided to the *code official.*

R406.4 (N1106.4) Compliance report and other documentation. Compliance reports and other documentation shall be provided in accordance with Sections R406.4.1 through R406.4.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based upon the as-built condition of the building, shall be submitted to the *code official* before a certificate of occupancy is issued by the *code official*. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. Where the *proposed design* of a building could be built on different sites where the cardinal direction orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit, shall be based upon the worst case orientation worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis.

R406.4.1 (N1106.4.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R406.4.2 (N1106.4.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building meets the requirements of the home energy rating system, HERS, index matrix of the RESNET Standards for code compliance and the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R406.4.3 (N1106.4.3) Additional documentation. Upon request by the *code official,* the following documentation shall be provided along with compliance reports to the *code official*:

1. Documentation of the building component characteristics of the *standard reference design.*
2. A certification statement, signed by the builder, that lists the *proposed design* building component characteristics indicated in Table R405.5.2(1).

R406.5 (N1106.5) Calculation procedure. Calculations of the energy performance of a building design shall be in accordance with Sections R406.5.1 and R406.5.2.

R406.5.1 (N1106.5.1) Identical methods. The *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques to generate a separate index score for each configuration of the buildingThe methods and techniques shall be in accordance with the home energy efficiency rating system, HERS, guidelines in the RESNET Standards.

R406.5.2 (N1106.5.2) Building design specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as indicated in Table R405.5.2(1).

R406.6 (N1106.6) Calculation software tools. Calculation software shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Minimum capabilities. Software tools shall be capable of calculating the index score of all building elements that differ between the *standard reference design* and the *proposed design.* The software shall have the following capabilities:

1. Computer generation of a report for the *standard reference design* using only the input for the *proposed design.* The calculation software shall prohibit the user from directly modifying the building component characteristics of the *standard reference design.*
2. Calculation of whole-building sizing , as a single *zone,* for the heating and cooling equipment in the *standard reference design* building in accordance with Section R403.6.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printing an inspection checklist for the *code official* that lists the characteristic of each of the *proposed design* components indicated in Table R405.5.2(1) that was used to determine compliance. The component characteristics shall include the performamce rating for the component such as, but not limited to, *R-value*, *U-factor*, *SHGC*, heating seasonal performance factor-HSPF, annual fuel utilization efficiency-AFUE, seasonal energy efficiency ratio-SEER and energy factor-EF.

R406.6.2 (N1106.6.2) Specific approval. Energy performance analysis tools that do not have accreditation by the Residential Energy Services Network organization shall comply with all other requirements of Section 406 and such tools shall only be used where the tool is *approved*.

R406.6.3 (N1106.6.3) Input values. Where calculations or software programs require input values that are not specified in Sections R402, R403, R404, R405 and R406, the input values used shall be only from *approved* sources.

Add new standard to Chapter 5 as follows:

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

RESNET

RESNET Standards-2013 RESNET Mortgage Industry National Home Energy Rating Standards.

Reason: The current annual energy cost matrix for demonstrating code compliance is flawed and may demonstrate that a house that should pass the energy code, based on actual geometry and energy specifications, may not only because the energy costs in a region have changed. More and more jurisdiction and builders across the country are turning to performance index scores to represent the efficiency of a home and to demonstrate code compliance. Performance scores in and of themselves do not necessarily demonstrate code compliance. However, if the score is imposed on the existing structure of the code as this new alternative compliance path section 406 does, the score can reflect code compliance simply as a means of demonstrating passing and failing.

The current structure of the simulated performance path requires that the mandatory sections of the IECC be complied with, thus ensuring that house performance is maintained and that the score is only a measure to demonstrate compliance. In addition, this new section 406 utilizes the code reference home as described in table 405.5.2(1) and therefore energy code compliance utilizing this pathway will have a score that is variable for each qualified home. This is accomplished through the 2015 IECC Reference Design outlined in table 405.5.2(1). When the builder’s proposed designed home is configured with the IECC reference design features and modeled using approved software, the resulting score becomes the basis for the performance score target for that home.

The EPA Energy Star program and the DOE Challenge Home program utilize this same matrix for demonstrating qualification for their programs and have demonstrated that the compliance path described in this new section 406 will set the score target for the performance path equal to the performance that would be achieved if the prescriptive path was followed for each individual home.

In this way jurisdictions can avoid developing a fixed value, or performance index score, which really has no bearing on compliance and instead set the index score threshold required for energy code compliance at the same value that the same house would earn if configured to the IECC prescriptive path, as outlined in table 405.5.2(1) Reference Design.
** Footnote to Energy Star and DOE Challenge Home program documents

Jurisdiction, Builders, third party inspection companies and others are not clear of the process for completing and utilizing the simulated performance path. With all pathways through the energy code one must in essence declare how they will meet the intent of the code. For the prescriptive path they simply say they are going prescriptive, for the UA trade off path they submit a document such as a RESCheck report, and for the simulated performance path they must currently submit a document demonstrating that the annual energy cost of the proposed design are less than or equal to the same home if it were built with the reference design specification. It becomes unclear how one demonstrates that they have carried out their proposed design. The revisions proposed for this section clearly outlines a process by which the proposed design is submitted, inspections take place, and additional analysis is preformed to ensure that the proposed design was achieved or bettered for the purposes of compliance.

Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building a plan is often mastered and that one plan may be built over 100 times. To ensure that each house meets the performance analysis each home must be inspected.
2. Computer generated energy analysis' utilizes worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actually built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms, and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the homes plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is address and site specific which ultimately ensures that the home that received its permit from the proposed design's energy analysis has carried out what they have proposed, which is to meet the intent of the code, even if each component of the home is not exactly the same as what was on the set of plans.

Cost Impact: The code change proposal will not increase the cost of construction more than is already done by the current section R405 simulated performance path.

Analysis: A review of the standards proposed for inclusion in the code, RESNET Standards, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R406T (NEW)-EC-SCHARZ.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The standard proposed for inclusion in the code does not comply with CP#28, Section 3.6.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robby Schwarz, EnergyLogic, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R406 (N1106)

SIMULATED PERFORMANCE ~~BY~~
INDEX SCORE ~~METHOD~~ ALTERNATIVE
(PERFORMANCE)

R406.1 (N1106.1) Scope. ~~The simulated performance index score method in Section R406 shall be used for~~ This section establishes criteria using simulated energy performance analysis resulting in an Index score used to ~~determining that a building complies~~ determine compliance with this code. ~~Such~~ This ~~methods~~ method shall include a whole house energy analysis resulting in comparative index scores unique to the reference home and proposed design.

R406.2 (N1106.2) Mandatory requirements. Use of the simulated performance index score alternative ~~method~~ ~~for compliance to this code~~ shall require all of the following:

1. Design and construction of the building in compliance with sections in this code that are indicated as mandatory.
2. Inspections, required for the generation of an index score, are performed including, but not limited to, inspection, by the entity or person performing the energy analysis, of insulation systems and air barriers prior to concealment.
3. Supply and return ducts not completely inside the *building thermal envelope* are insulated with not less than an *R-value* of R-8.
4. ~~Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope,* shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, whichever is less.~~

R406.3 (N1106.3) Performance-based compliance. The proposed building (*proposed design*) shall be ~~complaint~~ compliant with this code ~~where~~ when the index score generated by the energy analysis is less than or equal to the index score of the *standard reference design*. The *standard reference design* index score shall be determined by analyzing a building of identical geometry to the proposed building that has the features indicated in the *standard reference design* column of Table R405.5.2(1). The index score of the proposed design shall be calculated in accordance with RESNET standards Chapter #3 " National Energy Rating Technical Standard" and shall only analyze the building components described in Table R405.5.2(1) that are common to both homes.

R406.3.1 (N1106.3.1) Compliance software tools. Software tools used to determine code compliance by the simulated performance index score ~~method~~ shall be accredited by the Residential Energy Services Network organization or its equivalent. Documentation showing the software accreditation shall be provided to the *code official.*

R406.4 (N1106.4) Compliance report and other documentation. Compliance reports and other documentation shall be provided in accordance with Sections R406.4.1 through R406.4.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based upon the as-built condition of the building, shall be submitted to the *code official* before a certificate of occupancy is issued ~~by the *code official*~~.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. Where the *proposed design* of a building could be built on different sites where the cardinal direction orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit, shall be based upon the worst case orientation worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis.

R406.4.1 (N1106.4.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R406.4.2 (N1106.4.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following: Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

1. Building street address, or other building site identification
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building meets the requirements of the ~~home energy rating system, HERS,~~ index score ~~matrix of the RESNET Standards~~ for code compliance and the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R406.4.3 (N1106.4.3) Additional documentation. Upon request by the *code official,* the following documentation shall be provided along with compliance reports to the *code official*:

1. Documentation of the building component characteristics of the *standard reference design.*
2. A certification ~~statement, signed by the builder,~~ that lists the *proposed design* building component characteristics indicated in Table R405.5.2(1).

R406.5 (N1106.5) Calculation procedure. Calculations of the energy performance of a building design shall be in accordance with Sections R406.5.1 and R406.5.2.

R406.5.1 (N1106.5.1) Identical methods. The *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques to generate a separate index score for each configuration of the building. The methods and techniques shall be in accordance with the home energy efficiency rating system, HERS, guidelines in the RESNET Standards <u>Chapter #3 " National Energy Rating Technical Standard"</u>.

R406.5.2 (N1106.5.2) Building design specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as indicated in Table R405.5.2(1).

R406.6 (N1106.6) Calculation software tools. Calculation software shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Minimum capabilities. Software tools shall be capable of calculating the index score of all building elements that differ between the *standard reference design* and the *proposed design.* The software shall have the following capabilities:

1. Computer generation of a report for the *standard reference design* using only the input for the *proposed design.* The calculation software shall prohibit the user from directly modifying the building component characteristics of the *standard reference design.*
2. Calculation of whole-building sizing , as a single *zone,* for the heating and cooling equipment in the *standard reference design* building in accordance with Section R403.6*.*
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printing an inspection checklist for the *code official* that lists the characteristic of each of the *proposed design* components indicated in Table R405.5.2(1) that was used to determine compliance. The component characteristics shall include the performance rating for the component such as, but not limited to<u>;</u> *R-value*, *U-factor*, *SHGC*, heating seasonal performance factor-HSPF, annual fuel utilization efficiency-AFUE, seasonal energy efficiency ratio-SEER and energy factor-EF.

R406.6.2 (N1106.6.2) Specific approval. Energy performance analysis tools that do not have accreditation by the Residential Energy Services Network organization shall comply with all other requirements of Section 406 and such tools shall only be used where the tool is *approved* <u>by the code official</u>.

R406.6.3 (N1106.6.3) Input values. Where calculations or software programs require input values that are not specified in Sections R402, R403, R404, R405 and R406, the input values used shall be only from *approved* sources.

Commenter's Reason: The committee stated that the original proposal did not comply with CP#28 section 3.6. I believe that CP#28 Code Development Section 3.6 is being followed here with regards to RESNET Standard <u>Chapter #3 " National Energy Rating Technical Standard"</u> and software accreditation. Specifically section 3.6.3.1 outlines the ability to include reference to a proposed new standard.

- "The standard shall be completed and readily available prior to Final Action Consideration based on the cycle of code development which includes the proposed code change proposal.
- In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4.
- If a new standard is not submitted in at least draft form, the code change shall be considered incomplete and shall not be processed.
- Updating of standards without corresponding code text changes shall be accomplished administratively in accordance with Section 4.5.

In addition CP#28 states that the standard shall be developed and maintained through a consensus process such as ASTM or ANSI and does not state that is has to be ASTM or ANSI. RESNET has repetealy assured me that Chapter 3 will achieve ANSI approval before the final action hearing in October. However, even if the standard does not it was created utilizing a consensus process as outlined in CP#28.

The current annual energy cost matrix for demonstrating code compliance is flawed and may demonstrate that a house that should pass the energy code, based on actual geometry and energy specifications, may not only because the energy costs in a region have changed. More and more jurisdiction and builders across the country are turning to performance index scores to represent the efficiency of a home and to demonstrate code compliance. Performance scores in and of themselves do not necessarily demonstrate code compliance. However, if the score is imposed on the existing structure of the code as this new alternative compliance path section 406 does, the score can reflect code compliance simply as a means of demonstrating passing and failing.

The current structure of the simulated performance path requires that the mandatory sections of the IECC be complied with, thus ensuring that house performance is maintained and that the score is only a measure to demonstrate compliance. In addition, this new section 406 utilizes the code reference home as described in table 405.5.2(1) and therefore energy code compliance utilizing this pathway will have a score that is variable for each qualified home. This is accomplished through the 2015 IECC Reference Design outlined in table 405.5.2(1). When the builder's proposed designed home is configured with the IECC reference design features and modeled using approved software, the resulting score becomes the basis for the performance score target for that home.

The EPA Energy Star program and the DOE Challenge Home program utilize this same matrix for demonstrating qualification for their programs and have demonstrated that the compliance path described in this new section 406 will set the score target for the performance path equal to the performance that would be achieved if the prescriptive path was followed for each individual home. In this way jurisdictions can avoid developing a fixed value, or performance index score, which really has no bearing on compliance and instead set the index score threshold required for energy code compliance at the same value that the same house would earn if configured to the IECC prescriptive path, as outlined in table 405.5.2(1) Reference Design.

** Footnote to Energy Star and DOE Challenge Home program documents

Jurisdictions, Builders, third party inspection companies do not have a consistent process for completing and utilizing the simulated performance path. With all pathways through the energy code one must in essence declare how they will meet the intent of the code. For the prescriptive path they simply say they are going prescriptive, for the UA trade off path they submit a document such as a RESCheck report, and for the simulated performance path they must currently submit a document demonstrating that the annual energy cost of the proposed design are less than or equal to the same home if it were built with the reference design specification. It becomes unclear how one demonstrates that they have carried out their proposed design. The revisions proposed for this section clearly outlines a process by which the proposed design is submitted, inspections take place, and additional analysis is preformed to ensure that the proposed design was achieved or bettered for the purposes of compliance.
Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building a plan is often mastered and that one plan may be built repeatedly over time. To ensure that each house meets the performance analysis each home must be inspected.
2. Computer generated energy analysis' utilizes worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actually built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms, and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the homes plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is accurate and site specific. Ultimately a home that received its permit from a proposed design's energy analysis must be inspected to meet the intent of the code, as component's of the home may not be exactly the same as what was on the set of plans.

CP#28 Code Development Section 3.6 is being followed here with regards to RESNET Standard Chapter #3 " National Energy Rating Technical Standard" and software accreditation. Specifically section 3.6.3.1 outlines the ability to include reference to a proposed new standard.

- "The standard shall be completed and readily available prior to Final Action Consideration based on the cycle of code development which includes the proposed code change proposal.
- In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4.
- If a new standard is not submitted in at least draft form, the code change shall be considered incomplete and shall not be processed.
- Updating of standards without corresponding code text changes shall be accomplished administratively in accordance with Section 4.5.

In addition CP#28 states that the standard shall be developed and maintained through a consensus process such as ASTM or ANSI and does not state that is has to be ASTM or ANSI.

RE190-13
Final Action: AS AM AMPC____ D

RE191-13
R402.1.2, R402.1.4 (IRC N1102.1.2, N1102.1.4)

Proposed Change as Submitted

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

R402.1.2 (N1102.1.2) Sum of the *R*-values ~~computation~~ of insulation only. Only the insulation material used in layers, such as framing cavity insulation and continuous insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown or loose-fill insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films or the thermal bridging effects of framing materials. Fenestration *U*-factors and SHGC requirements shall comply with Table R402.1.1.

R402.1.3 (N1102.1.3)*U*-factor alternative. An assembly with a *U*-factor equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the *R*-value in Table R402.1.1.

R402.1.4 (N1102.1.4)Total UA alternative. If the total *building thermal envelope* UA (sum of *U*-factor times assembly area) is less than or equal to the total UA resulting from using the *U*-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* with *R*-values and *U*-factors consistent with ASHRAE 90.1 Normative Appendix 'A', and shall include the thermal bridging effects of framing materials in accordance with ASHRAE 90.1, Normative Appendix 'A'. The *U*-factor and SHGC requirements shall be met in addition to UA compliance.

Reason: The additions further clarify the intentions of the framers of the 2004 IECC Supplement Edition that Section R402.1.2 expressly prohibits the use of computed R-values of materials "other than insulation as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], or framing correction factors rooted in accepted engineering practice and the use of *approved* consensus standards. This specifically precludes Authorities Having Jurisdiction from employing Section R102 "Alternate Materials and Methods" to permit a solicitor to gain advantage outside the public forum and debate of the *ICC Code Development Process for the International Codes* (CP-28), or through an ICC-ES-facilitated, environmental criteria, to condone the use of *R*-values for other building materials or air films or the thermal bridging effects of framing materials under IECC Section R402.1.2.

Reference to the ASHRAE 90.1 Standard establishes neutral measurements of the efficiency of thermal envelope components, either "as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], including ASHRAE's research into established framing correction factors based on in-situ studies and accepted engineering practice.

In February 2012, at the conclusion of Illinois' required 9-month review process of the 2012 IECC, the Illinois Energy Code Advisory Council (ECAC) performed an analysis of four (4) alternative proposals submitted the Coalition for Fair Energy Codes (CFEC). American Plywood Association (APA) Trustees representing structural panel producing members of the APA, and including participation by the American Wood Council (AWC) formed the coalition in January 2011 to address the perceived notion that the 2012 IECC has the potential to reduce annual demand for OSB and plywood wall sheathing by approximately 20 percent, or close to 1 billion sq. ft. in a normal housing demand year.

The premise of these proposals was to seek alternative criteria for various wall configurations on the basis of equivalence with the prescriptive residential building thermal envelope R-value requirements of Table 402.1.1 using R-value computations and framing correction factors unrecognized by Section 402.1.1.

It was the conclusion of IECC LLC that CFEC methodologies made use of assumptions predisposed to product-bias or preferential treatment of particular materials, or assemblies of materials, and were not, in the end, neutral measurements of the efficiency of thermal envelope components, either "as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], or based on accepted engineering practice and the use of *approved* consensus standards.

It was also the conclusion of Illinois ECAC that the CFEC approach sought to re-argue a few of the unsuccessful public comments in opposition to code change proposals (EC13-09/10 and EC47-09/10) debated in public forum at the *ICC Code Development Process for the International Codes*.

On May 31, 2012, the ICC-Evaluation Service (ICC-ES) issued a peculiar and lesser publicized 30-day request for comment on a proposal for a new environmental criteria under the alternative criteria process entitled: *Environmental Criteria for Determination* *of Opaque Framed Wall Assemblies Deemed as Equivalent to the Prescriptive Building Thermal Envelope Tables of the International Energy Conservation Code®* (Subject EC115-0612-R1).

At hearings of the ICC-ES Environmental Committee, held October 1, 2012 at the Hilton St. Louis Frontenac, the Environmental Committee approved Subject EC115-1012-R2 by a vote of 4 -2 with one vote In Abstentia, despite clear language in Section 402.1.2 to the contrary, and Interpretations from ICC-ES's parent company, the International Code Council and its technical staff as follows:

2009 IECC, Section 402.1.2 - R-value Co

2009 IECC, Section 402.1.2 - R-value Co

2009 IECC, Sections 402.1.3-402.1.4 - U-

It was identified later that the proposal was solicited by Weyerhaeuser Company, one of the world's largest forest products companies, and a contributing company to CFEC.

In summary, without this change, the proposed Subject EC115, having been solicited by a proponent with bias, has the potential to create unnecessary loopholes and weaknesses in the *International Energy Conservation Code* (potentially dating to its former editions, circa IECC 2004). Furthermore, the proposed Subject EC115-0612-R1 could distance the IECC and Illinois (as with other states and U.S. territories adopting the 2009 or 2012 IECC Editions) from our Governors' assurances to the U.S. Department of Energy under Section 410 of the American Recovery and Reinvestment Act of 2009 (H.R. 1) (ARRA) as a condition of receiving funding for State Energy Programs (SEP).

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

R402.1.2-EC-MEYERS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The values in ASHRAE 90.1 are written for commercial buildings. There are some inconsistencies in ASHRAE 90.1 related to residential construction.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing Illinois Energy Office – Department of Commerce & Economic Opportunity, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.1.2 Sum of the *R*-values of insulation only. Only the insulation material used in layers, such as framing cavity insulation and continuous insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown or loose-fill insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films or the thermal bridging effects of framing materials. Fenestration and skylight *U*-factor~~s~~ and glazed fenestration SHGC requirements shall comply with Table R402.1.1.

R402.1.3 *U*-factor alternative. An assembly with a *U*-factor equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the *R*-value in Table R402.1.1.

R402.1.4 Total UA alternative. If the total *building thermal envelope* UA (sum of *U*-factor times assembly area) is less than or equal to the total UA resulting from using the *U*-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* with *R*-values and *U*-factors consistent with ASHRAE 90.1 Normative Appendix 'A', and shall include the thermal bridging effects of framing materials in accordance with ASHRAE 90.1, Normative Appendix 'A'. The ~~U-factor and~~ glazed fenestration SHGC requirements of Table R402.1.1 shall be met in addition to UA compliance.

Commenter's Reason: At the Dallas Public Hearings, the "ONLY" reason the IECC-R Committee recommended RE191-13 for "Disapproval" was that the Committee believed, "the values in ASHRAE 90.1 [to be] written for commercial buildings [only], and … [there was concern that] there were some inconsistencies in ASHRAE 90.1 related to residential construction."

The material properties, methods of construction, and correction factors set forth in ASHRAE 90.1 are founded on accepted engineering practice and the universally-accepted physical and thermal properties of construction materials in the known physical world.

NOTE: ASHRAE, founded in 1894, is a preeminent building technology society with more than 54,000 members worldwide. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Simply put, and solely with regard to the physical and thermal properties of construction materials, ASHRAE does not declare that heat transfers differently through a wall constructed of the "SAME" materials simply because the <<INSERT MATERIAL HERE>> (wood, steel, concrete, plastic, glazed fenestration, clay- or concrete-masonry) is installed in a one-story, single-family home (RESIDENTIAL), or a one-story, professional office building (COMMERCIAL), all else being equal.

Therefore, our proposal clarifies:

1) That reference to the ASHRAE *Handbook of Fundamentals* and ASHRAE Standard 90.1, an ICC-*approved* consensus document, establish neutral measurements of the efficiency of thermal envelope components, either "as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], or founded upon ASHRAE's own research, standards writing, publishing and investigations into accepted engineering practices;
2) That Section R402.1.2 (R-value Method) expressly prohibits the use of computed R-values of materials "other than insulation" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], to manipulate IECC-endorsed R-value and U-factor compliance methods;
3) That Section R401.2 (R-value Method) expressly prohibits the use of framing correction factors and air films to manipulate IECC-endorsed R-value and U-factor compliance methods;
4) That Sections R402.1.3 and 402.1.4 (U-factor and UA Methods, respectively) expressly prohibit the use of any material property including, but not limited to, framing correction factors, air films, R-Values and U-factors "other than those found in the ASHRAE *Handbook of Fundamentals* and the pre-calculated *R*-values and *U*-factors of ASHRAE 90.1 Normative Appendix 'A' to manipulate IECC-endorsed R-value and U-factor compliance methods; and that the SHGC requirements of glazed fenestration also be considered; and
5) That Section R102 "Alternate Materials and Methods," ICC-ES-facilitated reports or environmental criteria shall not be used by homebuilders, design professionals, or Authorities Having Jurisdiction to manipulate IECC-endorsed R-value and U-factor compliance methods.

RE191-13

Final Action: AS AM AMPC____ D

RE192-13

R202, R403.5, R403.5.2 (New) through R403.5.7 (New) , Table R403.5.6(1) (New) (IRC Table N1103.5.6(1)(New), Table R403.5.6(2) (New)

Proposed Change as Submitted

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

SECTION R202
GENERAL DEFINITIONS

LOCAL EXHAUST. An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a dwelling.

WHOLE HOUSE MECHANICAL VENTILATION SYSTEM. An exhaust system, supply system, or combination thereof that is designed in accordance with Section R403.5 to mechanically exchange indoor air for outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rate. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

Revise as follows:

R403.5 Mechanical ventilation (Mandatory). The building shall be provided with ventilation that meets the requirements of ~~the *International Residential Code*~~ this section or for Group R-2, R-3 and R-4 buildings, ventilation that meets the requirements of the *International Mechanical Code*, as applicable. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

R403.5.1 Whole-house mechanical ventilation system fan efficacy. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1.

Exception: Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor.

R403.5.2 Recirculation of air. Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or to another *dwelling unit* and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an *attic*, crawl space or other areas inside the building.

R403.5.3 Whole-house mechanical ventilation system. Whole-house mechanical ventilation systems shall be designed in accordance with Sections R403.5.4 through R403.5.6.

R403.5.4 System design. The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered to provide supply ventilation.

R403.5.5 System controls. The whole-house mechanical ventilation system shall be provided with controls that enable manual override.

R403.5.6 Mechanical ventilation rate. The whole house mechanical ventilation system shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table R403.5.6(1).

> **Exception:** The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25-percent of each 4-hour segment and the ventilation rate prescribed in Table R403.5.6(1) is multiplied by the factor determined in accordance with Table R403.5.6(2).

TABLE R403.5.6(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 – 1	2 – 3	4 – 5	6 – 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m_2, 1 cubic foot per minute = 0.0004719 m_3/s.

[RMP] TABLE R403.5.6(2) (Table N1103.5.6(1))

INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS[a, b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor[a]	4	3	2	1.5	1.3	1.0

a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited.

R403.5.7 Local exhaust rates. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum air flow rate determined in accordance with Table R403.5.7.

TABLE R403.5.7
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR ONE- AND TWO-FAMILY DWELLINGS

AREA TO BE EXHAUSTED	EXHAUST RATES
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m_3/s.

Reason: As of January 1, 2013, the state of Illinois has made effective the 2012 Illinois Energy Conservation Code (2012 ICC IECC) through the *Illinois Energy Efficient Building Act* [20 ILCS 3125], similar to what the States of Maryland and Minnesota, and various jurisdictions in Arizona (Glendale, Peoria, Pima County), Colorado (Vail), Kansas (Overland Park), Missouri (Kansas City), New Hampshire (Durham) and Texas (El Paso) have done … *[[Not an all-inclusive list.]]*

For Illinois, The Act takes precedence over home-rule declarations in our state; even those of the City of Chicago. However, The Act does not usurp municipal or county authority to adopt a building code, more specifically the *International Residential Code* (IRC). As such, and over Illinois' required 9-month review process of the 2012 IECC, the Illinois Energy Code Advisory Council (ECAC) concluded that a technical infeasibility would amount from adopting energy efficiency codes like the 2012 IECC which require whole-house mechanical ventilation, coupled with existing and/or delayed municipal ordinances tied to editions of the IRC prior to 2012. The 2012 IRC is the only edition of the IRC which provides a whole-house mechanical ventilation solution for homes with air leakage rates less than 5 ACH50.

Accordingly for Illinois adoption of the 2012 IECC, and we suspect other states and municipalities considering 2015 IECC adoptions, the economy, coupled with an overall lack of political will and municipal indifference to the mandatory residential sprinkler requirements of the 2009 and 2012 editions of the IRC, a disconnect results for new homes subject to 2012 IECC for air tightness (5 ACH50 or less)—thus, whole-house mechanical ventilation—and antiquated IRC editions which have not kept pace with this approach and the resultant whole-house mechanical ventilation solution.

In summary, this change merely reproduces the appropriate technical provisions and appropriate code development committee maintenance duties to the 2015 IECC.

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

Analysis. The provisions in this proposal are duplicated from Section M1507.3. The proponent chooses to propose this change only to the IECC-R, and not Chapter 11 of the IRC, to avoid possible divergence of matching provisions already present within the IRC – For example, Section M1507.3 of the IRC.

R403.5-EC-MEYERS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This code change proposal is a mechanical issue that belongs in the IRC-Mechanical Part or the IMC, not in the energy code. If local jurisdictions are having difficulty with this, then the issue needs to be solved locally.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing Illinois Energy Office – Department of Commerce & Economic Opportunity, requests Approval as Submitted.

Commenter's Reason: At the Dallas Public Hearings the "ONLY" reason the IECC-R Committee recommended RE192 for "Disapproval" was that the Committee believed the, "… proposal to be a mechanical issue that belongs in the IRC-Mechanical Part or the IMC, not in the energy code."

We are asking for "approval As Submitted," to simply and solely reproduce the appropriate technical provisions and code development maintenance duties for residential mechanical ventilation within the body of the 2015 IECC because:

1) States, regions, counties and local municipalities adopt energy codes (like the IECC) independently of residential construction codes (like the IRC). More often than not, the 2012 and 2015 Editions of the IRC, inclusive of the poison-pill that is "Mandatory Residential Sprinklers," are not adopted or overlooked as a result.
2) The 2012 and 2015 Editions of the IRC are the only editions of the IRC to require whole-house mechanical ventilation when the air leakage rate of the home is ≤ 5 ACH_{50}. The 2012 and 2015 Editions of the IECC are the only Editions of the IECC to require the air leakage rate of one- and two-family dwellings and townhouses to test-out at ≤ 5 ACH_{50}.
3) **IMPORTANT**: Construction of a home to the 2006 or 2009 Editions of the IRC in a State or jurisdiction that adopts the 2012 IECC or 2015 IECC CC will not provide adequate ventilation for human health. This proposal addresses this circumstance.

NOTE, this isn't the first time Mechanical or Plumbing provisions appear in the IECC:

4) Equipment load calculations to ACCA Manual J and selection and sizing to ACCA Manual S are mechanical issues, yet provisions exist in the IECC (**Section R403.6 Equipment Sizing**), because the implications of improper load calculation and incorrect equipment selection on building performance is within the scope of the energy code;
5) Duct insulation, duct leakage performance testing, and sealing are mechanical issues, yet provisions exist in the IECC (**Sections R403.2.1 Duct Insulation, R403.2.2 Duct Sealing,** and **R403.2.3 Building cavities**), because the implications of duct construction, insulation, and sealing on building performance is within the scope of the energy code;
6) Equipment efficiency is a mechanical issue, yet provisions exist in the IECC (**Section R405.3 Performance-based compliance**), because the implications of inadequate equipment performance on building design is within the scope of the energy code;

7) Piping insulation is both a mechanical and plumbing issue, yet provisions exist in the IECC (**Sections R403.3 Mechanical system piping insulation and R403.4.2 Hot water pipe insulation**), because the implications of inadequate piping insulation on building performance is within the scope of the energy code;

We ask for your support of "approval As Submitted," to simply and solely reproduce the appropriate technical provisions and code development maintenance duties for residential mechanical ventilation within the body of the 2015 IECC.

Public Comment 2:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R403.5 Mechanical ventilation (Mandatory). The building shall be provided with <u>mechanical</u> ventilation that meets the requirements of the *International Residential Code* or the *International Mechanical Code*, as applicable. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

Commenter's Reason: The original proposal sought to bring clarification to the mechanical ventilation requirements of the IRC and IMC that are referenced within this section. I would agree with the committee's disapproval on the basis that the specific mechanical ventilation requirements belong in the IMC and Chapter 15 of the IRC.

However, the clarification that does need to be made in this section is that the section with the heading of "Mechanical ventilation" really is referring to mechanical ventilation when it mentions "ventilation" within its subtext. As obvious as this sounds, this section is often misinterpreted because the word "mechanical" is not restated within the subtext. This change clears up this confusion

RE192-13

Final Action: AS AM AMPC____ D

RE193 – 13
R202 (IRC N1101.9), 403.10 (New) (IRC N1103.10 (New))

Proposed Change as Submitted

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

COMBUSTION APPLIANCE ZONE (CAZ). A contiguous air volume within a building that contains a containing a Category I or II atmospherically-vented appliance or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit. The CAZ includes but is not limited to, a mechanical closet, mechanical room, or the main body of a house or dwelling unit.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Mechanical or induced draft. The pressure difference created by the action of a fan, blower or ejector that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the *flue gases* and the atmosphere.

SPILLAGE. Combustion gases emerging from an appliance or venting system into the combustion appliance zone during burner operation.

Add new text as follows:

R403.10 (N1103.10) Worst-case testing of atmospheric venting systems. Buildings or dwelling units containing a Category I or II atmospherically-vented appliance; or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit, shall have the Combustion Appliance Zone (CAZ) tested for spillage, acceptable draft and carbon monoxide (CO) in accordance with this Section. Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* and prior to final inspection.

> **Exception:** Buildings or dwelling units containing only Category III or IV direct vent or integral vent appliances that do not draw combustion air from inside of the building or dwelling unit.

The enumerated test procedure below shall be followed during test

1. Set all combustion appliances to the pilot setting or turn off the service disconnects for all combustion appliances. Close all exterior doors and windows and the fireplace damper. With the building or dwelling unit in this configuration, measure and record the baseline ambient pressure inside the building or dwelling unit CAZ. Compare the baseline ambient pressure of the CAZ to that of the outside ambient pressure, and record the difference (Pa).
2. Establish worst case by turning on the *clothes dryer* and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, where present, and leave on if as a result, the pressure in the CAZ becomes more negative. Check interior door positions again, closing only the interior doors that make the CAZ pressure more negative. Measure net change in pressure from the CAZ to outdoor ambient pressure, correcting for the base ambient pressure inside the home. Record "worst case depressurization" pressure and compare to Table R403.10(1).

Where CAZ depressurization limits are exceeded under worst-case conditions according to Table R403.10(1), additional combustion air must be provided or other modifications to building air-leakage performance or exhaust appliances such that depressurization is brought within the limits prescribed in Table R403.10(1).

3. Measure worst case spillage, acceptable draft, and carbon monoxide (CO) by firing the fuel-fired appliance with the smallest Btu capacity first.

   a. Test for spillage at the draft diverter with a mirror or smoke puffer. An appliance that continues to spill flue gases for more than 60 seconds fails the spillage test.
   b. Test for CO measuring undiluted flue gases, in the throat or flue of the appliance using a digital gauge in parts per million (ppm) at the 10 minute mark. Record CO ppm readings to be compared with Table R403.10(3) upon completion of Step 4. Where the spillage test fails under worst case, go to Step 4.
   c. Where spillage ends within 60 seconds, test for acceptable draft in the connector no less than one foot, but no more than two feet downstream of the draft diverter. Record draft pressure and compare to Table R403.10(2).
   d. Fire all other connected appliances simultaneously and test again at the draft diverter of each appliance for spillage, CO and acceptable draft using procedures 3a through 3c.

4. Measure spillage, acceptable draft, and carbon monoxide (CO) under natural conditions—without *clothes dryer* and exhaust fans on—according to the procedure outlined in Step 3, measuring the net change in pressure from worst case condition in Step 3 to natural in the CAZ to confirm the worst case depressurization taken in Step 2. Repeat the process for each appliance, allowing each vent system to cool between tests.
5. Monitor indoor ambient CO in the breathing zone continuously during testing, and abort the test where indoor ambient CO exceeds 35 ppm by turning off the appliance, ventilating the space, and evacuating the building. The CO problem must be corrected prior to completing combustion safety diagnostics.
6. Make recommendations based on test results and the retrofit action prescribed in Table R40310.3).

TABLE R403.10(1) (N1103.10(1))
CAZ DEPRESSURIZATION LIMITS

VENTING CONDITION	**LIMIT (Pa)**
Category I, atmospherically-vented water heater	-2.0
Category I or II atmospherically-vented boiler or furnace common-vented with a Category I atmospherically-vented water heater	-3.0
Category I or II atmospherically-vented boiler or furnace, equipped with a flue damper, and common-vented with a Category I atmospherically-vented water heater	-5.0
Category I or II atmospherically-vented boiler or furnace alone	
Category I or II atmospherically-vented, fan-assisted boiler or furnace common-vented with a Category I atmospherically-vented water heater	
Decorative vented, gas appliance	
Power vented or induced-draft boiler or furnace alone, or fan assisted water heater alone	-15.0
Category IV direct vented appliances and sealed combustion appliances	-50.0

For SI: 6894.76 Pa = 1.0 psi.

TABLE R403.10(2) (N1103.10(2))
ACCEPTABLE DRAFT TEST CORRECTION

OUTSIDE TEMPERATURE (°F)	**MINIMUM DRAFT PRESSURE REQUIRED (Pa)**

< 10	-2.5
10 – 90	(Outside Temperature ÷ 40) – 2.75
> 90	-0.5

For SI: 6894.76 Pa = 1.0 psi.

TABLE R403.10(3) (N1103.10(3))
ACCEPTABLE DRAFT TEST CORRECTION

CARBON DIOXIDE LEVEL (ppm)	**AND OR**	**SPILLAGE AND ACCEPTABLE DRAFT TEST RESULTS**	**RETROFIT ACTION**
0 – 25	and	Passes	Proceed with work
25 < x ≤ 100	and	Passes	Recommend that CO problem be resolved
25 < x ≤ 100	and	Fails in worst case only	Recommend an appliance service call and repairs to resolve the problem
100 < x ≤ 400	or	Fails under natural conditions	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Passes	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Fails under any condition	**Emergency!** Shut off fuel to appliance and call for service immediately

Reason: Energy efficiency improvements often have a direct impact on the building pressure boundary affecting the safe operation of combustion equipment. Routinely sealing up buildings without looking at the combustion equipment risk sooner or later will result in harming someone with back-drafted flue gas conditions.

This proposal is intended to provide clear guidance to builders, code officials and home performance contractors for worst-case testing of atmospheric venting systems where air-sealing techniques and air-leakage performance testing requirements of the 2015 IECC are employed. Worst case testing is used by home performance contractors to identify problems that weaken draft and restrict combustion air. Worst case vent testing uses the home's exhaust fans, air handling appliances and chimneys to create worst case depressurization in the combustion appliance zone (CAZ).

Language that is proposed for R403.10 is basically a distilled version of predominant combustion safety test procedures for atmospherically vented appliances found in readily available home performance programs across the country, such as EPA's Healthy Indoor Environments Protocols, EPA's Home Performance with Energy Star, DOE's Workforce Guidelines for Home Energy Upgrades, HUD's Community Development Block Grants and Weatherization Assistance Programs, BPI's Technical Standards for the Building Analyst Professional, and RESNET's Interim Guidelines for Combustion Appliance Testing and Writing Work Scopes. The proposed language is intended to take the combustion safety test procedures that are used most commonly by these home performance, weatherization, and beyond code programs, and reduce them to their simplest and most straightforward form for the purpose of combustion safety in IECC compliance and field assessment through the use of building diagnostic tools.

For Illinois, our required 9-month review process of the 2012 IECC resulted in the Illinois Energy Code Advisory Council (ECAC) concluding that reductions in building envelope air-leakage from 7 ACH50 (2009 IECC) to 5 ACH50 was a more conservative approach to take for the construction industry in our state than the more "aggressive" 7 ACH50 (2009 IECC) to 3 ACH50, as is the case with the 2012 IECC for Climate Zones 4 and 5.

While part of ECAC's consideration was the decision to insert the 2012 IRC's whole-house ventilation provisions based on ASHRAE 62.2 directly into the Illinois Energy Conservation Code, this proposal recognizes that under certain conditions, perhaps even those of forthcoming 2015 IECC, reduced natural air-leakage coupled with the installation of atmospheric combustion appliances will reduce air exchange to the outside with the potential to contribute to poor indoor air quality and possible health problems due to spillage, inadequate draft, or carbon monoxide concerns.

We suspect other states and municipalities considering 2015 IECC adoptions will seek similar building diagnostic-based solutions to combustion safety.

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

RE193-13

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

R403.10 (NEW)-EC-MEYERS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Addressment of the issue of combustion air issues is a mechanical code issue, rather than an energy code issue. The IECC committee is not qualified to deal with this issue.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IECC-R: Renumber definitions and sections of proposed text as a new "informative" Appendix A. The text of the new Appendix A would read as follows:

APPENDIX A
RECOMMENDED PROCEDURE FOR WORST-CASE TESTING OF ATMOSPHERIC VENTING SYSTEMS UNDER R402.4 OR R405 CONDITIONS ≤ 5ACH$_{50}$
(This appendix is informative and is not part of the code.)

SECTION A101
SCOPE

A101.1 General. This appendix is intended to provide guidelines for worst-case testing of atmospheric venting systems. Worst case testing is recommended to identify problems that weaken draft and restrict combustion air.

SECTION A202
GENERAL DEFINITIONS

COMBUSTION APPLIANCE ZONE (CAZ). A contiguous air volume within a building that contains a containing a Category I or II atmospherically-vented appliance or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit. The CAZ includes but is not limited to, a mechanical closet, mechanical room, or the main body of a house or dwelling unit.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Mechanical or induced draft. The pressure difference created by the action of a fan, blower or ejector that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the *flue gases* and the atmosphere.

SPILLAGE. Combustion gases emerging from an appliance or venting system into the combustion appliance zone during burner operation.

A301.1 ~~R403.10~~ Worst-case testing of atmospheric venting systems. Buildings or dwelling units containing a Category I or II atmospherically-vented appliance; or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit, shall have the Combustion Appliance Zone (CAZ) tested for spillage, acceptable draft and carbon monoxide (CO) in accordance with this Section. Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* and prior to final inspection.

> **Exception:** Buildings or dwelling units containing only Category III or IV direct vent or integral vent appliances that do not draw combustion air from inside of the building or dwelling unit.

The enumerated test procedure below shall be followed during test

1. Set all combustion appliances to the pilot setting or turn off the service disconnects for all combustion appliances. Close all exterior doors and windows and the fireplace damper. With the building or dwelling unit in this configuration, measure and record

the baseline ambient pressure inside the building or dwelling unit CAZ. Compare the baseline ambient pressure of the CAZ to that of the outside ambient pressure, and record the difference (Pa).

2. Establish worst case by turning on the *clothes dryer* and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, where present, and leave on if as a result, the pressure in the CAZ becomes more negative. Check interior door positions again, closing only the interior doors that make the CAZ pressure more negative. Measure net change in pressure from the CAZ to outdoor ambient pressure, correcting for the base ambient pressure inside the home. Record "worst case depressurization" pressure and compare to Table A301.1(1) ~~R403.10(1)~~.

   Where CAZ depressurization limits are exceeded under worst-case conditions according to Table A301.1(1) ~~R403.10(1)~~, additional combustion air must be provided or other modifications to building air-leakage performance or exhaust appliances such that depressurization is brought within the limits prescribed in Table A301.1(1) ~~R403.10(1)~~.

3. Measure worst case spillage, acceptable draft, and carbon monoxide (CO) by firing the fuel-fired appliance with the smallest Btu capacity first.

   a. Test for spillage at the draft diverter with a mirror or smoke puffer. An appliance that continues to spill flue gases for more than 60 seconds fails the spillage test.
   b. Test for CO measuring undiluted flue gases, in the throat or flue of the appliance using a digital gauge in parts per million (ppm) at the 10 minute mark. Record CO ppm readings to be compared with Table A301.1(3) ~~R403.10(3)~~ upon completion of Step 4. Where the spillage test fails under worst case, go to Step 4.
   c. Where spillage ends within 60 seconds, test for acceptable draft in the connector no less than one foot, but no more than two feet downstream of the draft diverter. Record draft pressure and compare to Table A301.1(2) ~~R403.10(2).~~
   d. Fire all other connected appliances simultaneously and test again at the draft diverter of each appliance for spillage, CO and acceptable draft using procedures 3a through 3c.

4. Measure spillage, acceptable draft, and carbon monoxide (CO) under natural conditions—without *clothes dryer* and exhaust fans on—according to the procedure outlined in Step 3, measuring the net change in pressure from worst case condition in Step 3 to natural in the CAZ to confirm the worst case depressurization taken in Step 2. Repeat the process for each appliance, allowing each vent system to cool between tests.
5. Monitor indoor ambient CO in the breathing zone continuously during testing, and abort the test where indoor ambient CO exceeds 35 ppm by turning off the appliance, ventilating the space, and evacuating the building. The CO problem must be corrected prior to completing combustion safety diagnostics.
6. Make recommendations based on test results and the retrofit action prescribed in Table A301.1(3) ~~R403.10(3).~~

TABLE A301.1(1) ~~R403.10(1)~~
CAZ DEPRESSURIZATION LIMITS

<table>
<tr><th>VENTING CONDITION</th><th>LIMIT (Pa)</th></tr>
<tr><td>Category I, atmospherically-vented water heater</td><td>-2.0</td></tr>
<tr><td>Category I or II atmospherically-vented boiler or furnace common-vented with a Category I atmospherically-vented water heater</td><td>-3.0</td></tr>
<tr><td>Category I or II atmospherically-vented boiler or furnace, equipped with a flue damper, and common-vented with a Category I atmospherically-vented water heater</td><td rowspan="4">-5.0</td></tr>
<tr><td>Category I or II atmospherically-vented boiler or furnace alone</td></tr>
<tr><td>Category I or II atmospherically-vented, fan-assisted boiler or furnace common-vented with a Category I atmospherically-vented water heater</td></tr>
<tr><td>Decorative vented, gas appliance</td></tr>
<tr><td>Power vented or induced-draft boiler or furnace alone, or fan assisted water heater alone</td><td>-15.0</td></tr>
<tr><td>Category IV direct vented appliances and sealed combustion appliances</td><td>-50.0</td></tr>
</table>

For SI: 6894.76 Pa = 1.0 psi.

TABLE A301.1(2) ~~R403.10(2)~~
ACCEPTABLE DRAFT TEST CORRECTION

OUTSIDE TEMPERATURE (°F)	MINIMUM DRAFT PRESSURE REQUIRED (Pa)
< 10	-2.5
10 – 90	(Outside Temperature ÷ 40) – 2.75
> 90	-0.5

For SI: 6894.76 Pa = 1.0 psi.

TABLE A301.1(3) ~~R403.10(3)~~
ACCEPTABLE DRAFT TEST CORRECTION

CARBON DIOXIDE LEVEL (ppm)	AND OR	SPILLAGE AND ACCEPTABLE DRAFT TEST RESULTS	RETROFIT ACTION
0 – 25	and	Passes	Proceed with work
25 < x ≤ 100	and	Passes	Recommend that CO problem be resolved
25 < x ≤ 100	and	Fails in worst case only	Recommend an appliance service call and repairs to resolve the problem
100 < x ≤ 400	or	Fails under natural conditions	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Passes	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Fails under any condition	**Emergency!** Shut off fuel to appliance and call for service immediately

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Public Comment 2:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IRC: Renumber definitions and sections of proposed text as a new "informative" Appendix R. The text of the new Appendix R would read as follows:

APPENDIX R
RECOMMENDED PROCEDURE FOR WORST-CASE TESTING OF ATMOSPHERIC VENTING SYSTEMS UNDER N1102.4 OR N1105 CONDITIONS ≤ $5ACH_{50}$
(This appendix is informative and is not part of the code.)

SECTION AR101
SCOPE

AR101.1 General. This appendix is intended to provide guidelines for worst-case testing of atmospheric venting systems. Worst case testing is recommended to identify problems that weaken draft and restrict combustion air.

SECTION AR202 ~~(N1101.9)~~
GENERAL DEFINITIONS

COMBUSTION APPLIANCE ZONE (CAZ). A contiguous air volume within a building that contains a containing a Category I or II atmospherically-vented appliance or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit. The CAZ includes but is not limited to, a mechanical closet, mechanical room, or the main body of a house or dwelling unit.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Mechanical or induced draft. The pressure difference created by the action of a fan, blower or ejector that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the *flue gases* and the atmosphere.

SPILLAGE. Combustion gases emerging from an appliance or venting system into the combustion appliance zone during burner operation.

AR301.1 ~~**N1103.10**~~ **Worst-case testing of atmospheric venting systems.** Buildings or dwelling units containing a Category I or II atmospherically-vented appliance; or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit, shall have the Combustion Appliance Zone (CAZ) tested for spillage, acceptable draft and carbon monoxide (CO) in accordance with this Section. Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* and prior to final inspection.

> **Exception:** Buildings or dwelling units containing only Category III or IV direct vent or integral vent appliances that do not draw combustion air from inside of the building or dwelling unit.

The enumerated test procedure below shall be followed during test

1. Set all combustion appliances to the pilot setting or turn off the service disconnects for all combustion appliances. Close all exterior doors and windows and the fireplace damper. With the building or dwelling unit in this configuration, measure and record the baseline ambient pressure inside the building or dwelling unit CAZ. Compare the baseline ambient pressure of the CAZ to that of the outside ambient pressure, and record the difference (Pa).

2. Establish worst case by turning on the *clothes dryer* and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, where present, and leave on if as a result, the pressure in the CAZ becomes more negative. Check interior door positions again, closing only the interior doors that make the CAZ pressure more negative. Measure net change in pressure from the CAZ to outdoor ambient pressure, correcting for the base ambient pressure inside the home. Record "worst case depressurization" pressure and compare to Table AR301.1(1) ~~N1103.10(1)~~.

   Where CAZ depressurization limits are exceeded under worst-case conditions according to Table AR301.1(1) ~~N1103.10(1)~~, additional combustion air must be provided or other modifications to building air-leakage performance or exhaust appliances such that depressurization is brought within the limits prescribed in AR301.1(1) ~~R403.10(1)~~.

3. Measure worst case spillage, acceptable draft, and carbon monoxide (CO) by firing the fuel-fired appliance with the smallest Btu capacity first.

   a. Test for spillage at the draft diverter with a mirror or smoke puffer. An appliance that continues to spill flue gases for more than 60 seconds fails the spillage test.
   b. Test for CO measuring undiluted flue gases, in the throat or flue of the appliance using a digital gauge in parts per million (ppm) at the 10 minute mark. Record CO ppm readings to be compared with Table AR301.1(3) ~~R403.10(3~~) upon completion of Step 4. Where the spillage test fails under worst case, go to Step 4.
   c. Where spillage ends within 60 seconds, test for acceptable draft in the connector no less than one foot, but no more than two feet downstream of the draft diverter. Record draft pressure and compare to Table AR301.1(2) ~~N1103.10(2)~~.
   d. Fire all other connected appliances simultaneously and test again at the draft diverter of each appliance for spillage, CO and acceptable draft using procedures 3a through 3c.

4. Measure spillage, acceptable draft, and carbon monoxide (CO) under natural conditions—without *clothes dryer* and exhaust fans on—according to the procedure outlined in Step 3, measuring the net change in pressure from worst case condition in Step 3 to natural in the CAZ to confirm the worst case depressurization taken in Step 2. Repeat the process for each appliance, allowing each vent system to cool between tests.
5. Monitor indoor ambient CO in the breathing zone continuously during testing, and abort the test where indoor ambient CO exceeds 35 ppm by turning off the appliance, ventilating the space, and evacuating the building. The CO problem must be corrected prior to completing combustion safety diagnostics.
6. Make recommendations based on test results and the retrofit action prescribed in Table AR301.1(3) ~~N1103.10(3)~~.

TABLE AR301.1(1) ~~N1103.10(1)~~
CAZ DEPRESSURIZATION LIMITS

VENTING CONDITION	LIMIT (Pa)
Category I, atmospherically-vented water heater	-2.0
Category I or II atmospherically-vented boiler or furnace common-vented with a Category I atmospherically-vented water heater	-3.0
Category I or II atmospherically-vented boiler or furnace, equipped with a flue damper, and common-vented with a Category I atmospherically-vented water heater	-5.0
Category I or II atmospherically-vented boiler or furnace alone	
Category I or II atmospherically-vented, fan-assisted boiler or furnace common-vented with a Category I atmospherically-vented water heater	
Decorative vented, gas appliance	
Power vented or induced-draft boiler or furnace alone, or fan assisted water heater alone	-15.0
Category IV direct vented appliances and sealed combustion appliances	-50.0

For SI: 6894.76 Pa = 1.0 psi.

TABLE AR301.1(2) ~~N1103.10(2)~~
ACCEPTABLE DRAFT TEST CORRECTION

OUTSIDE TEMPERATURE (°F)	MINIMUM DRAFT PRESSURE REQUIRED (Pa)
< 10	-2.5
10 – 90	(Outside Temperature ÷ 40) – 2.75
> 90	-0.5

For SI: 6894.76 Pa = 1.0 psi.

TABLE AR301.1(3) ~~N1103.10(3)~~
ACCEPTABLE DRAFT TEST CORRECTION

CARBON DIOXIDE LEVEL (ppm)	AND OR	SPILLAGE AND ACCEPTABLE DRAFT TEST RESULTS	RETROFIT ACTION
0 – 25	and	Passes	Proceed with work
25 < x ≤ 100	and	Passes	Recommend that CO problem be resolved
25 < x ≤ 100	and	Fails in worst case only	Recommend an appliance service call and repairs to resolve the problem
100 < x ≤ 400	or	Fails under natural conditions	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Passes	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Fails under any condition	**Emergency!** Shut off fuel to appliance and call for service immediately

Commenter's Reason: At the Dallas Public Hearings, and shortly after the IECC-R Committee deemed themselves "unqualified" to deal with the topic, the reason they cited for recommending RE193-13 for "Disapproval" was that the Committee believed the "… proposal to be a mechanical issue belonging to the IRC-Mechanical Part or the IMC, not in the energy code."

Others, representing the fuel gas industry, deemed the issue a matter belonging to the IRC-Fuel Gas Part or even the IFGC;" despite key takeaways from AGA's presentation to a Building America Expert Meeting on Combustion Safety identifying a "gap" in the IFGC (a.k.a., IFGS-ANSI Z223.1-NFPA 54), where combustion air guidelines were last revised circa 2001 to account for lower infiltration rates in newly constructed homes.

The Expert Meeting took place in June 2012, with the report from the Gas Technology Institute's (GTI's) Partnership for Advanced Residential Retrofit (PARR), issued nine-months later in March 2013. Another key takeaway from the March 2013 PARR report reads, "It might be appropriate to revisit these assumptions as houses are built tighter (gap)."

The PARR Report goes on to identify a key point in Section 2.5.2, "More than 5 Pa of depressurization reverses most [atmospheric] vent[ing] systems. That is equivalent to a dryer operating in a closed house tested at 450 CFM at 50 Pascal of depressurization. Water heaters spill more in warmer weather than colder weather because of the physics of buoyancy [convection] …," and cites "[u]nbalanced central returns in the HVAC system [as] a significant cause of depressurization."

We request approval As Modified by this Public Comment (AMPC) in that:

1) Combustion safety testing is an important part of the test-in and test-out process in new IRC/IECC construction projects when atmospherically vented appliances are used and houses are being tightened at or below 5ACH50 in accordance with the 2012/2015 IRC or the 2012/2015 IECC;
2) It is clear that the pace of air-sealing to nationally-adopted, consensus-developed energy codes has outpaced the capacity of consensus developed fuel gas standards in response;
3) This proposal provides clear guidance to builders, code officials and home-energy performance contractors for worst-case testing of atmospheric venting systems where air-sealing techniques and air-leakage performance testing requirements of the 2012 or 2015 IRC/IECC are employed.
4) This proposal avoids the "one-size-fits-all" solution of "enclosure" ($), or use of a separately-enclosed and insulated mechanical room surrounding the atmospherically vented appliances, with direct combustion air connections, and located either in a basement or adjacent to the home; and
5) It is not likely the Building America Program, an Expert Panel, or PARR will be ready to provide a nationally-harmonized methodology for combustion safety testing to 2012 or 2015 IRC/IECC envelopes (i.e., ≤ 5ACH50) before the beginning of the 2018 Group 'A' I-Code Hearings (Deadline–January, 2015), with the 2018 Editions of I-Codes published, May 2017;

If your State or jurisdiction has adopted, or is contemplating adoption of, a 2012 or 2015 Edition of the IRC/IECC, can you or the national building regulatory community afford to wait? Note also, that the original proposal has been revised from mandatory code language to an informative (non-mandatory) appendix.

We request your support in approving of RE191-13 As Modified by this Public Comment (AMPC)

RE193-13
Final Action: AS AM AMPC____ D

RE195-13
Table R402.1.2 (IRC N1102.1.2)

Proposed Change as Submitted

Proponent: Matt Dobson, Representing Vinyl Siding Institute

Revise as follows:

R402.1.2 (N1102.1.2) R-value computation. Insulation material used in layers, such as framing cavity insulation, insulating sheathing and <u>insulated siding</u> shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films. <u>For the purpose of complying with Table R402.1.1, the manufacturer's labeled R-value shall be reduced by R-0.6 for insulated siding.</u>

Reason: This simple addition to the paragraph allows insulated siding to be used as part of the calculation. This is important, as prior to the advent of insulated siding, the prescriptive approach prohibits including the siding's R-value. This change will help to create more innovative ways to meet the energy code requirements and improve energy efficiency.

Because the R-value for siding is already credited as part of the prescriptive compliance method used with Table R402.1.1, that amount, R-0.6, must be deducted from the manufacturer labeled R-value of the insulated siding. This would mean that if the insulated siding's tested R-value (based on an ASTM C1363 test) were R-3.6, that only R-3.0 could be used to help comply through the prescriptive method of Table R402.1.1. Additionally, it should be understood that air films (both on the front and back of the insulated siding) are not taken into account during the R-value testing for insulated siding, so credits for those air films in the prescriptive section should remain in place.

For more information about insulated siding, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will not increase the cost of construction and could potentially reduce costs by offering an additional option for compliance with the prescriptive path.

R402.1.2-EC-DOBSON

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R402.1.2 (N1102.1.2) R-value computation. Insulation material used in layers, such as framing cavity insulation, ~~insulating sheathing and insulated siding~~ <u>or continuous insulation</u> shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films. ~~For the purpose of complying with Table R402.1.1, the manufacturer's labeled R-value shall be reduced by R-0.6 for insulated siding.~~ <u>Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table R402.1.1, the manufacturer's labeled R-Value for insulated siding shall be reduced by R-0.6.</u>

Committee Reason: Committee Reason: This proposal will add more information about a product that can be used to meet code envelope requirements. This gives builders more flexibility with more products that can be used to meet the code requirements. The modification is a rewrite to clarify proponent's intent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R402.1.2 (N1102.1.2) R-value computation. Insulation material used in layers, such as framing cavity insulation, or continuous insulation shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films. Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table R402.1.1, the manufacturer's labeled insulation R-Value ~~for insulated siding~~ shall be ~~reduced by R-0.6~~ used.

Commenter's Reason: For R-value the IECC requires an R-value that only includes the insulation. CE67 was modified to include a manufacturer's insulation-only R-value label. Therefore the 0.6 reduction here would be a double reduction and is not needed.

IECC Section R402.1.2 "R-value computation" says "Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component Rvalue. The manufacturer's settled R-value shall be used for blown insulation. **Computed R -values shall not include an R-value for other building materials or air films**

RE195-13

Final Action: AS AM AMPC____ D

EB3-13

301.1, 301.2, 302 (New), 302.1 (New), 302.1.1 (New), 303 (New), 705.1, Chapter 16

Proposed Change as Submitted

Proponent: David S. Collins, FAIA, The Preview Group, Inc. (dcollins@preview-group.com), The American Institute of Architects and Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

CHAPTER 3
COMPLIANCE METHODS, APPLICABILITY AND MINIMUM REQUIREMENTS

301.1 General. The *repair*, *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant in addition to complying with the minimum requirements in Sections 302 and 303. Application of a method shall be the sole basis for assessing the compliance of work performed under a single permit unless otherwise approved by the *code official*. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic force-resisting system of an existing building subject to *repair*, *alteration*, *change of occupancy*, *addition* or relocation of *existing buildings*, the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

> **Exception:** Subject to the approval of the *code official*, *alterations* complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural alteration as defined in Section 907.4.3. New structural members added as part of the *alteration* shall comply with the *International Building Code*. *Alterations* of *existing buildings* in *flood hazard areas* shall comply with Section 701.3.

SECTION 302
ADDITIONAL CODES AND REQUIREMENTS

~~**301.2 Additional codes**~~ **302.1 General.** *Alterations, repairs, additions* and *changes of occupancy* to, or relocation of, *existing buildings* and structures shall comply with the provisions for *alterations, repairs, additions* and *changes of occupancy* or relocation, respectively, in this code and the *International Energy Conservation Code*, *International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code*, *International Residential Code* and NFPA 70. Where provisions of the other codes conflict with provisions of this code, the provisions of this code shall take precedence.

302.1.1 Accessibility. Level 1 alterations shall comply with the 2015 ANSI A117.1 to the extent of the altered element. Areas of an existing building that are outside the specific work area or otherwise unaffected by alterations Level 1, 2 or 3, that are required to be accessible by Chapter 7 shall comply with the 2003 ANSI A117.1.
Work performed under Level 2 and 3 alterations shall comply with the 2015 ANSI A117.1 and all spaces that change configuration as part of the alterations shall comply with the 2015 ANSI A117.1.

SECTION 303
EXISTING BUILDING MINIMUM REQUIREMENTS

303.1 Administration. Sections 303.1.1 through 303.1.4 shall set the scope, intent and administration of provisions related to minimum requirements that are applicable to existing buildings.

303.1.1 ([F] 1101.1) Scope. The provisions of this Section shall apply to existing buildings constructed prior to the adoption of this code.

303.1.2 ([F] 1101.2) Intent. The intent of this Section is to provide a minimum degree of fire and life safety to persons occupying existing buildings by providing minimum construction requirements where such existing buildings do not comply with the minimum requirements of the International Building Code.

303.1.3 ([F] 1101.3) Permits. Permits for alterations necessary to conform with this Section shall be required as set forth in Sections 105.1.

303.1.4 ([F] 1101.4) Owner notification. When a building is found to be in noncompliance with this chapter, the code official shall duly notify the owner of the building. Upon receipt of such notice, the owner shall, subject to the following time limits, take necessary actions to comply with the provisions of this chapter.

303.1.4.1 ([F] 1101.4.1) Construction documents. Construction documents necessary to comply with this chapter shall be completed and submitted within a time schedule approved by the code official.

303.1.4.2 ([F] 1101.4.2) Completion of work. Work necessary to comply with this chapter shall be completed within a time schedule approved by the code official.

303.1.4.3 ([F] 1101.4.3) Extension of time. The code official is authorized to grant necessary extensions of time when it can be shown that the specified time periods are not physically practical or pose an undue hardship. The granting of an extension of time for compliance shall be based on the showing of good cause and subject to the filing of an acceptable systematic plan of correction with the code official.

303.2 ([F] SECTION 1103) Fire safety requirements for existing buildings. Minimum fire safety requirements for existing buildings shall be in provided in accordance with Sections 303.2.1 through 303.2.9.

SECTION	USE			OCCUPANCY CLASSIFICATION																		
	High rise	Atrium or covered mall	Under-ground building	A	B	E	F	H1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
301.3.5	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
301.3.6	R	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
301.3.7.1	R	-	R	-	-	-	-	-	-	-	-	-	R	R	R	R	-	-	-	-	-	-
301.3.7.2	R	-	R	R	R	R	R	R	R	R	R	R	-	-	-	-	R	R	R	-	R	R
301.3.7.3	R	-	R	R	R	R	R	R	R	R	R	R	-	-	-	-	R	R	R	-	R	R
301.3.7.4	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301.3.7.5	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-
301.3.7.6	-	-	-	R		R	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
301.3.7.7	-	-	-	R		R	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
301.3.8.1	-	-	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
301.3.8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-
301.3.9.1	R	-	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	-	R	R
301.3.9.2	R	-	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	-	R	R
301.3.10.1	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301.3.10.2	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-
301.3.10.3	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-
301.3.10.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-
301.3.10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-

301.3.10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-
301.3.10.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-
301.3.10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	R	R	R	-
301.3.11	R	-	-	-	-	-	-	-	-	-	-	-	R	R	R	R	-	R	R	R	R	-
301.3.12.4.1	R	R	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	R	R	R

303.2.1 ([F] 1103.1) Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 303.2.1 and as further enumerated in Sections 303.2.2 through 303.2.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exception: Group U occupancies.

TABLE 303.2.1 ([F] TABLE 1103.1)
OCCUPANCY AND USE REQUIREMENTS[a]

a. Existing buildings shall comply with the Sections identified as "Required" (R) based on occupancy classification or use, or both, whichever is applicable.

R = The building is required to comply.

303.2.2 ([F] 1103.2) Emergency responder radio coverage in existing buildings. Existing buildings that do not have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building, shall be equipped with such coverage according to one of the following:

1. Whenever an existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1 of the *International Fire Code*.
2. Within a time frame established by the adopting authority.

Exception: Where it is determined by the ~~fire~~ code official that the radio coverage system is not needed.

303.2.3 ([F] 1103.3) Elevator operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

303.2.4 ([F] 1103.4) Vertical openings. Interior vertical shafts, including but not limited to stairways, elevator hoistways, service and utility shafts, that connect two or more stories of a building, shall be enclosed or protected as specified in Sections 303.2.4.1 through 303.2.4.7.

303.2.4.1 ([F] 1103.4.1) Group I occupancies. In Group I occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

303.2.4.2 ([F] 1103.4.2) Three to five stories. In other than Group I occupancies, interior vertical openings connecting three to five stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

Exceptions:
1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.

3. Vertical opening protection for escalators shall be in accordance with Section 303.2.4.5, 303.2.4.6 or 303.2.4.7.

303.2.4.3 ([F] 1103.4.3) More than five stories. In other than Group I occupancies, interior vertical openings connecting more than five stories shall be protected by 1-hour fire-resistance-rated construction.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.
3. Vertical opening protection for escalators shall be in accordance with Section 303.2.4.5, 303.2.4.6 or 303.2.4.7.

303.2.4.4 ([F] 1103.4.4) Atriums and covered malls. In other than Group I occupancies, interior vertical openings in a covered mall building or a building with an atrium shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.

303.2.4.5 ([F] 1103.4.5) Escalators in Group B and M occupancies. Escalators creating vertical openings connecting any number of stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code* installed throughout the building, with a draft curtain and closely spaced sprinklers around the escalator opening.

303.2.4.6 ([F] 1103.4.6) Escalators connecting four or fewer stories. In other than Group B and M occupancies, escalators creating vertical openings connecting four or fewer stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* shall be installed throughout the building, and a draft curtain with closely spaced sprinklers shall be installed around the escalator opening.

303.2.4.7 ([F] 1103.4.7) Escalators connecting more than four stories. In other than Group B and M occupancies, escalators creating vertical openings connecting five or more stories shall be protected by 1-hour fire-resistance-rated construction.

303.2.5 ([F] 1103.5) Sprinkler systems. An automatic sprinkler system shall be provided in existing buildings in accordance with Sections 303.2.5.1 and 303.2.5.2.

303.2.5.1 ([F] 1103.5.1) Pyroxylin plastics. An automatic sprinkler system shall be provided throughout existing buildings where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds (45 kg). Vaults located within buildings for the storage of raw pyroxylin shall be protected with an approved automatic sprinkler system capable of discharging 1.66 gallons per minute per square foot (68 L/min/m^2) over the area of the vault.

303.2.5.2 ([F] 1103.5.2) Group I-2. An automatic sprinkler system shall be provided throughout existing Group I-2 fire areas. The sprinkler system shall be provided throughout the floor where the Group I-2 occupancy is located, and in all floors between the Group I-2 occupancy and the level of exit discharge.

303.2.6 ([F] 1103.6) Standpipes. Where required by Sections 303.2.6.1 or 303.2.6.2, standpipes shall be installed in accordance with Section 905 of the *International Building Code*. The code official is authorized to approve the installation of manual standpipe systems to achieve compliance with this Section where the responding fire department is capable of providing the required hose flow at the highest standpipe outlet.

303.2.6.1 ([F] 1103.6.1) Existing multiple-story buildings. Existing buildings with occupied floors located more than 50 feet (15 240 mm) above the lowest level of fire department access or more than 50 feet (15 240 mm) below the highest level of fire department access shall be equipped with standpipes.

303.2.6.2 ([F] 1103.6.2) Existing helistops and heliports. Existing buildings with a rooftop helistop or heliport located more than 30 feet (9144 mm) above the lowest level of fire department access to the roof level on which the helistop or heliport is located shall be equipped with standpipes in accordance with Section 905.3.6 of the *International Building Code*.

303.2.7 ([F] 1103.7) Fire alarm systems. An approved fire alarm system shall be installed in existing buildings and structures where required by Sections 303.2.7.1 through 303.2.7.7 and provide occupant notification in accordance with Section 907.6 of the *International Building Code* unless other requirements are provided by other Sections of this code.

Exception: Occupancies with an existing, previously approved fire alarm system.

303.2.7.1 ([F] 1103.7.1) Group E. A fire alarm system shall be installed in existing Group E occupancies in accordance with Section 907.2.3.

Exceptions:

1. A manual fire alarm system is not required in a building with a maximum area of 1,000 square feet (93 m^2) that contains a single classroom and is located no closer than 50 feet (15 240 mm) from another building.
2. A manual fire alarm system is not required in Group E occupancies with an occupant load less than 50.

303.2.7.2 ([F] 1103.7.2) Group I-1. An automatic fire alarm system shall be installed in existing Group I-1 residential care/assisted living facilities in accordance with Section 907.2.6.1 of the *International Building Code*.

Exceptions:

1. Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2 of the *International Building Code* are not exceeded.
2. Where each sleeping room has a means of egress door opening directly to an exterior egress balcony that leads directly to the exits in accordance with Section 1019 of the *International Building Code*, and the building is not more than three stories in height.

303.2.7.3 ([F] 1103.7.3) Group I-2. An automatic fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 907.2.6.2 of the *International Building Code*..

Exception: Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2.1 of the *International Building Code* are not exceeded.

303.2.7.4 ([F] 1103.7.4) Group I-3. An automatic and manual fire alarm system shall be installed in existing Group I-3 occupancies in accordance with Section 907.2.6.3 of the *International Building Code*.

303.2.7.5 ([F] 1103.7.5) Group R-1. A fire alarm system and smoke alarms shall be installed in existing Group R-1 occupancies in accordance with Sections 303.2.7.5.1 through 303.2.7.5.2.1.

303.2.7.5.1 ([F] 1103.7.5.1) Group R-1 hotel and motel manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the

International Building Code shall be installed in existing Group R-1 hotels and motels more than three stories or with more than 20 sleeping units.

Exceptions:

1. Buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.
2. Manual fire alarm boxes are not required throughout the building when the following conditions are met:
    - 2.1. The building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*;
    - 2.2. The notification appliances will activate upon sprinkler water flow; and
    - 2.3. At least one manual fire alarm box is installed at an approved location.

303.2.7.5.1.1 ([F] 1103.7.5.1.1) Group R-1 hotel and motel automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 hotels and motels throughout all interior corridors serving sleeping rooms not equipped with an approved, supervised sprinkler system installed in accordance with Section 903 of the *International Building Code*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units and where each sleeping unit has a means of egress door opening directly to an exit or to an exterior exit access that leads directly to an exit.

303.2.7.5.2 ([F] 1103.7.5.2) Group R-1 boarding and rooming houses manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 boarding and rooming houses.

Exception: Buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.

303.2.7.5.2.1 ([F] 1103.7.5.2.1) Group R-1 boarding and rooming houses automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 boarding and rooming houses throughout all interior corridors serving sleeping units not equipped with an approved, supervised sprinkler system installed in accordance with Section 903 of the *International Building Code*.

Exception: Buildings equipped with single-station smoke alarms meeting or exceeding the requirements of Section 907.2.11.1 of the *International Building Code* and where the fire alarm system includes at least one manual fire alarm box per floor arranged to initiate the alarm.

303.2.7.6 ([F] 1103.7.6) Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 dwelling or sleeping units.

Exceptions:

1. Where each living unit is separated from other contiguous living units by fire barriers having a fire-resistance rating of not less than 0.75 hour, and where each living unit has either its own independent exit or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an approved supervised automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* and having a local alarm to notify all occupants.

3. A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*, provided that dwelling units either have a means of egress door opening directly to an exterior exit access that leads directly to the exits or are served by open-ended corridors designed in accordance with Section 1026.6, Exception 4 of the *International Building Code*.

303.2.7.7 ([F] 1103.7.7) Group R-4. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-4 residential care/assisted living facilities in accordance with Section 907.2.10.1 of the *International Building Code*.

Exceptions:

1. Where there are interconnected smoke alarms meeting the requirements of Section 907.2.11 of the *International Building Code* and there is at least one manual fire alarm box per floor arranged to continuously sound the smoke alarms.
2. Other manually activated, continuously sounding alarms approved by the code official.

303.2.8 ([F] 1103.8) Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be installed in existing Group I-1 and R occupancies in accordance with Sections 303.2.8.1 through 303.2.8.3.

303.2.8.1 ([F] 1103.8.1) Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*, except as provided in Sections 303.2.8.2 or 303.2.8.3.

Exceptions:

1. Where the code that was in effect at the time of construction required smoke alarms and smoke alarms complying with those requirements are already provided.
2. Where smoke alarms have been installed in occupancies and dwellings that were not required to have them at the time of construction, additional smoke alarms shall not be required provided that the existing smoke alarms comply with requirements that were in effect at the time of installation.
3. Where smoke detectors connected to a fire alarm system have been installed as a substitute for smoke alarms.

303.2.8.2 ([F] 1103.8.2) Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling or sleeping unit, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

Exceptions:

1. Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.
2. Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

303.2.8.3 ([F] 1103.8.3) Power source. Single-station smoke alarms shall receive their primary power from the building wiring provided that such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
2. Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
3. Smoke alarms are permitted to be solely battery operated in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.

303.2.9 ([F] 1103.9) Carbon monoxide alarms. Existing Group I or R occupancies located in a building containing a fuel-burning appliance or a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034, and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in the International Building Code, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be deemed to be an attached garage.

Exception: Sleeping units or dwelling units which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The sleeping unit or dwelling unit is located more than one story above or below any story that contains a fuel-burning appliance or an attached garage;
2. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and
3. The building is provided with a common area carbon monoxide alarm system.

303.3 ([F] 1104.1). Means of egress. Means of egress in existing buildings shall comply with the minimum egress requirements when specified in Table 303.2.1 as further enumerated in Sections 303.3.1 through 303.3.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 303.2.1 as further enumerated in Sections 303.3.1 through 303.3.23.

303.3.1 ([F] 1104.2) Elevators, escalators and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required means of egress.

Exceptions:

1. Elevators used as an accessible means of egress where allowed by Section 1007.4 of the *International Building Code*.
2. Previously approved escalators and moving walks in existing buildings.

303.3.2 ([F] 1104.3) Exit sign illumination. Exit signs shall be internally or externally illuminated. The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 footcandles (54 lux). Internally illuminated signs shall provide equivalent luminance and be listed for the purpose.

Exception: Approved self-luminous signs that provide evenly illuminated letters shall have a minimum luminance of 0.06 foot-lamberts (0.21 cd/m2).

303.3.3 ([F] 1104.4) Power source. here emergency illumination is required in Section 303.3.4, exit signs shall be visible under emergency illumination conditions.

> **Exception:** Approved signs that provide continuous illumination independent of external power sources are not required to be connected to an emergency electrical system.

303.3.4 ([F] 1104.5) Illumination emergency power. The power supply shall normally be provided by the premises' electrical supply. In the event of power supply failure, illumination shall be automatically provided from an emergency system for the following occupancies where such occupancies require two or more means of egress:

1. Group A having 50 or more occupants.

   Exception: Assembly occupancies used exclusively as a place of worship and having an occupant load of less than 300.

2. Group B buildings three or more stories in height, buildings with 100 or more occupants above or below a level of exit discharge serving the occupants or buildings with 1,000 or more total occupants.
3. Group E in interior stairs, corridors, windowless areas with student occupancy, shops and laboratories.
4. Group F having more than 100 occupants.

   Exception: Buildings used only during daylight hours which are provided with windows for natural light in accordance with the International Building Code.

5. Group I.
6. Group M.

   Exception: Buildings less than 3,000 square feet (279 m2) in gross sales area on one story only, excluding mezzanines.

7. Group R-1.

   Exception: Where each sleeping unit has direct access to the outside of the building at grade.

8. Group R-2.

   Exception: Where each dwelling unit or sleeping unit has direct access to the outside of the building at grade.

9. Group R-4.

   Exception: Where each sleeping unit has direct access to the outside of the building at ground level.

303.3.4.1 ([F] 1104.5.1) Emergency power duration and installation. In other than Group I-2, the emergency power system shall provide power for not less than 60 minutes and consist of storage batteries, unit equipment or an on-site generator. In Group I-2, the emergency power system shall provide power for not less than 90 minutes and consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 1006.3 of the *international Building Code*.

303.3.5 ([F] 1104.6) Guards. Guards complying with this Section shall be provided at the open sides of means of egress that are more than 30 inches (762 mm) above the floor or grade below.

303.3.5.1 ([F] 1104.6.1) Height of guards. Guards shall form a protective barrier not less than 42 inches (1067 mm) high.

Exceptions:

1. Existing guards on the open side of stairs shall be not less than 30 inches (760 mm) high.
2. Existing guards within dwelling units shall be not less than 36 inches (910 mm) high.
3. Existing guards in assembly seating areas.

303.3.5.2 ([F] 1104.6.2) Opening limitations. Open guards shall have balusters or ornamental patterns such that a 6-inch-diameter (152 mm) sphere cannot pass through any opening up to a height of 34 inches (864 mm).

Exceptions:

1. At elevated walking surfaces for access to, and use of, electrical, mechanical or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches (533 mm) cannot pass through any opening.
2. In occupancies in Group I-3, F, H or S, the clear distance between intermediate rails measured at right angles to the rails shall not exceed 21 inches (533 mm).
3. Approved existing open guards.

303.3.6 ([F] 1104.7) Size of doors. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 28 inches (711 mm). Where this Section requires a minimum clear width of 28 inches (711 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 28 inches (711 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. Means of egress doors in an occupancy in Group I-2 used for the movement of beds shall provide a clear width not less than 41.5 inches (1054 mm). The height of doors shall not be less than 80 inches (2032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in occupancies in Groups R-2 and R-3.
2. Door openings to storage closets less than 10 square feet (0.93 m^2) in area shall not be limited by the minimum width.
3. Width of door leafs in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
4. Door openings within a dwelling unit shall not be less than 78 inches (1981 mm) in height.
5. Exterior door openings in dwelling units, other than the required exit door, shall not be less than 76 inches (1930 mm) in height.
6. Exit access doors serving a room not larger than 70 square feet (6.5 m^2) shall be not less than 24 inches (610 mm) in door width.

303.3.7 ([F] 1104.8) Opening force for doors. The opening force for interior side-swinging doors without closers shall not exceed a 5-pound (22 N) force. For other side-swinging, sliding and folding doors, the door latch shall release when subjected to a force of not more than 15 pounds (66 N). The door shall be set in motion when subjected to a force not exceeding 30 pounds (133 N). The door shall swing to a full-open position when subjected to a force of not more than 50 pounds (222 N). Forces shall be applied to the latch side.

303.3.8 ([F] 1104.9) Revolving doors. Revolving doors shall comply with the following:

1. A revolving door shall not be located within 10 feet (3048 mm) of the foot or top of stairs or escalators. A dispersal area shall be provided between the stairs or escalators and the revolving doors.
2. The revolutions per minute for a revolving door shall not exceed those shown in Table 303.3.8.
3. Each revolving door shall have a conforming side-hinged swinging door in the same wall as the revolving door and within 10 feet (3048 mm).

Exceptions:

1. A revolving door is permitted to be used without an adjacent swinging door for street-floor elevator lobbies provided a stairway, escalator or door from other parts of the building does not discharge through the lobby and the lobby does not have any occupancy or use other than as a means of travel between elevators and a street.
2. Existing revolving doors are permitted where the number of revolving doors does not exceed the number of swinging doors within 20 feet (6096 mm).

303.3.8 TABLE ([F] 1104.9)
REVOLVING DOOR SPEEDS

INSIDE DIAMETER (feet-inches)	POWER-DRIVEN-TYPE SPEED CONTROL (rpm)	MANUAL-TYPE SPEED CONTROL (rpm)
6-6	11	12
7-0	10	11
7-6	9	11
8-0	9	10
8-6	8	9
9-0	8	9
9-6	7	8
10-0	7	8

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

303.3.8.1 ([F] 1104.9.1) Egress component. A revolving door used as a component of a means of egress shall comply with Section 1104.9 and all of the following conditions:

1. Revolving doors shall not be given credit for more than 50 percent of the required egress capacity.
2. Each revolving door shall be credited with not more than a 50-person capacity.
3. Revolving doors shall be capable of being collapsed when a force of not more than 130 pounds (578 N) is applied within 3 inches (76 mm) of the outer edge of a wing.

303.3.9 ([F] 1104.10) Stair dimensions for existing stairs. Existing stairs in buildings shall be permitted to remain if the rise does not exceed 81/4 inches (210 mm) and the run is not less than 9 inches (229 mm). Existing stairs can be rebuilt.

Exception: Other stairs approved by the code official.

303.3.9.1 ([F] 1104.10.1) Dimensions for replacement stairs. The replacement of an existing *stairway* in a structure shall not be required to comply with the new *stairway* requirements of Section 1009 of the International Building Code where the existing space and construction will not allow a reduction in pitch or slope.

303.3.10 ([F] 1104.11) Winders. Existing winders shall be allowed to remain in use if they have a minimum tread depth of 6 inches (152 mm) and a minimum tread depth of 9 inches (229 mm) at a point 12 inches (305 mm) from the narrowest edge.

303.3.11 ([F] 1104.12) Circular stairways. Existing circular stairs shall be allowed to continue in use provided the minimum depth of tread is 10 inches (254 mm) and the smallest radius shall not be less than twice the width of the stairway.

303.3.12 ([F] 1104.13) Stairway handrails. Stairways shall have handrails on at least one side. Handrails shall be located so that all portions of the stairway width required for egress capacity are within 44 inches (1118 mm) of a handrail.

Exception: Aisle stairs provided with a center handrail are not required to have additional handrails.

303.3.12.1 ([F] 1104.13.1) Height. Handrail height, measured above stair tread nosings, shall be uniform, not less than 30 inches (762 mm) and not more than 42 inches (1067 mm).

303.3.13 ([F] 1104.14) Slope of ramps. Ramp runs utilized as part of a means of egress shall have a running slope not steeper than one unit vertical in 10 units horizontal (10-percent slope). The slope of other ramps shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

303.3.14 ([F] 1104.15) Width of ramps. Existing ramps are permitted to have a minimum width of 30 inches (762 mm) but not less than the width required for the number of occupants served as determined by the *International Building Code.*

303.3.15 ([F] 1104.16) Fire escape stairs. Fire escape stairs shall comply with Sections 303.3.15.1 through 303.15.7.

303.3.15.1 ([F] 1104.16.1) Existing means of egress. Fire escape *stairs* shall be permitted in existing buildings but shall not constitute more than 50 percent of the required *exit* capacity.

303.3.15.2 ([F] 1104.16.2) Protection of openings. Openings within 10 feet (3048 mm) of fire escape stairs shall be protected by opening protectives having a minimum $^3/_4$-hour fire protection rating.

> **Exception:** In buildings equipped throughout with an approved automatic sprinkler system, opening protection is not required.

303.3.15.3 ([F] 1104.16.3) Dimensions. Fire escape *stairs* shall meet the minimum width, capacity, riser height and tread depth as specified in Section 303.3.9.

303.3.15.4 ([F] 1104.16.4) Access. Access to a fire escape *stair* from a *corridor* shall not be through an intervening room. Access to a fire escape *stair* shall be from a door or window meeting the criteria of Section 1005.1 of the *International Building Code*. Access to a fire escape *stair* shall be directly to a balcony, landing or platform. These shall be no higher than the floor or window sill level and no lower than 8 inches (203 mm) below the floor level or 18 inches (457 mm) below the window sill.

303.3.15.5 ([F] 1104.16.5) Materials and strength. Components of fire escape *stairs* shall be constructed of noncombustible materials. Fire escape *stairs* and balconies shall support the dead load plus a live load of not less than 100 pounds per square foot (4.78 kN/m^2). Fire escape *stairs* and balconies shall be provided with a top and intermediate handrail on each side.

303.3.15.5.1 ([F] 1104.16.5.1) Examination. Fire escape *stairs* and balconies shall be examined for structural adequacy and safety in accordance with Section 303.15.5 by a registered design professional or others acceptable to the *fire code official* every five years, or as required by the *fire code official*. An inspection report shall be submitted to the *fire code official* after such examination.

303.3.15.6 ([F] 1104.16.6) Termination. The lowest balcony shall not be more than 18 feet (5486 mm) from the ground. Fire escape *stairs* shall extend to the ground or be provided with counterbalanced *stairs* reaching the ground.

> **Exception:** For fire escape *stairs* serving 10 or fewer occupants, an *approved* fire escape ladder is allowed to serve as the termination.

303.3.15.7 ([F] 1104.16.7) Maintenance. Fire escapes shall be kept clear and unobstructed at all times and shall be maintained in good working order.

303.3.16 ([F] 1104.17) Corridors. Corridors serving an occupant load greater than 30 and the openings therein shall provide an effective barrier to resist the movement of smoke. Transoms, louvers, doors and other openings shall be kept closed or self-closing.

Exceptions:

1. Corridors in occupancies other than in Group H, which are equipped throughout with an approved automatic sprinkler system.
2. Patient room doors in corridors in occupancies in Group I-2 where smoke barriers are provided in accordance with the *International Building Code*.
3. Corridors in occupancies in Group E where each room utilized for instruction or assembly has at least one-half of the required means of egress doors opening directly to the exterior of the building at ground level.
4. Corridors that are in accordance with the *International Building Code*.

303.3.16.1 ([F] 1104.17.1) Corridor openings. Openings in corridor walls shall comply with the requirements of the International Building Code.

Exceptions:

1. Where 20-minute fire door assemblies are required, solid wood doors at least 1.75 inches (44 mm) thick or insulated steel doors are allowed.
2. Openings protected with fixed wire glass set in steel frames.
3. Openings covered with 0.5-inch (12.7 mm) gypsum wallboard or 0.75-inch (19.1 mm) plywood on the room side.
4. Opening protection is not required when the building is equipped throughout with an approved automatic sprinkler system.

303.3.16.2 ([F] 1104.17.2) Dead ends. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that dead ends do not exceed the limits specified in Table 303.16.2.

Exception: A dead-end passageway or corridor shall not be limited in length where the length of the dead-end passageway or corridor is less than 2.5 times the least width of the dead-end passageway or corridor.

303.3.16.2 TABLE ([F] 1104.17.2)
COMMON PATH, DEAD-END AND TRAVEL DISTANCE LIMITS (by occupancy)

OCCUPANCY	COMMON PATH LIMIT		DEAD-END LIMIT		TRAVEL DISTANCE LIMIT	
	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)
Group A	20/75[a]	20/75[a]	20[b]	20[b]	200	250
Group B[f]	75	100	50	50	200	300
Group E	75	100	50	50	200	300
Group F-1, S-1[d,f]	75	100	50	50	200	250
Group F-2, S-2[d,f]	75	100	50	50	300	400
Group H-1	25	25	0	0	75	75
Group H-2	50	100	0	0	75	100
Group H-3	50	100	20	20	100	150
Group H-4	75	75	20	20	150	175
Group H-5	75	75	20	50	150	200
Group I-1	75	75	20	50	200	250
Group I-2 (Health care)	NR[e]	NR[e]	NR	NR	150	200[c]
Group I-3 (Detention and correctional – Use Conditions II, III, IV, V)	100	100	NR	NR	150[c]	200[c]
Group I-4 (Day care centers)	NR	NR	20	20	200	250
Group M (Covered or open mall)	75	100	50	50	200	400
Group M (Mercantile)	75	100	50	50	200	250
Group R-1 (Hotels)	75	75	50	50	200	250
Group R-2	75	125	50	50	200	250

(Apartments)						
Group R-3 (One- and two-family)	NR	NR	NR	NR	NR	NR
Group R-4 (Residential care/assisted living)	NR	NR	NR	NR	NR	NR
Group U	75	100	20	50	300	400

NR = No requirements.
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m2.

a. 20 feet for common path serving 50 or more persons; 75 feet for common path serving less than 50 persons.
b. See Section 1028.9.5 for dead-end aisles in Group A occupancies.
c. This dimension is for the total travel distance, assuming incremental portions have fully utilized their allowable maximums. For travel distance within the room, and from the room exit access door to the exit, see the appropriate occupancy chapter.
d. See the International Building Code for special requirements on spacing of doors in aircraft hangars.
e. Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet shall have at least two exit access doors placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the patient sleeping room or suite to be served, measured in a straight line between exit access doors.
f. Where a tenant space in Group B, S and U occupancies has an occupant load of not more than 30, the length of a common path of egress travel shall not be more than 100 feet.

303.3.17 ([F] 1104.18) Exit access travel distance. Exits shall be located so that the maximum length of exit access travel, measured from the most remote point to an approved exit along the natural and unobstructed path of egress travel, does not exceed the distances given in Table 301.3.12.15.2.

303.3.18 ([F] 1104.19) Common path of egress travel. The common path of egress travel shall not exceed the distances given in Table 301.3.12.15.2.

303.3.19 ([F] 1104.20) Stairway discharge identification. An interior exit stairway or ramp which continues below its level of exit discharge shall be arranged and marked to make the direction of egress to a public way readily identifiable.

Exception: Stairs that continue one-half story beyond their levels of exit discharge need not be provided with barriers where the exit discharge is obvious.

303.3.20 ([F] 1104.21) Exterior stairway protection. Exterior exit stairs shall be separated from the interior of the building as required in Section 1026.6 of the *International Building Code*. Openings shall be limited to those necessary for egress from normally occupied spaces.

Exceptions:

1. Separation from the interior of the building is not required for buildings that are two stories or less above grade where the level of exit discharge serving such occupancies is the first story above grade.
2. Separation from the interior of the building is not required where the exterior stairway is served by an exterior balcony that connects two remote exterior stairways or other approved exits, with a perimeter that is not less than 50 percent open. To be considered open, the opening shall be a minimum of 50 percent of the height of the enclosing wall, with the top of the opening not less than 7 feet (2134 mm) above the top of the balcony.
3. Separation from the interior of the building is not required for an exterior stairway located in a building or structure that is permitted to have unenclosed interior stairways in accordance with Section 1022 of the *International Building Code*.
4. Separation from the interior of the building is not required for exterior stairways connected to open-ended corridors, provided that:
   - 4.1. The building, including corridors and stairs, is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.
   - 4.2. The open-ended corridors comply with Section 1018.2 of the *International Building Code*.

4.3. The open-ended corridors are connected on each end to an exterior exit stairway complying with Section 1026 of the *International Building Code*.

4.4. At any location in an open-ended corridor where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3 m2) or an exterior stairway shall be provided. Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.

303.3.21 ([F] 1104.22) Minimum aisle width. The minimum clear width of aisles shall be:

1. Forty-two inches (1067 mm) for aisle stairs having seating on each side.

   Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

2. Thirty-six inches (914 mm) for stepped aisles having seating on only one side.

   Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

3. Twenty inches (508 mm) between a stepped aisle handrail or guard and seating when the aisle is subdivided by the handrail.

4. Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

   Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

5. Thirty-six inches (914 mm) for level or ramped aisles having seating on only one side.

   Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

6. Twenty-three inches (584 mm) between a stepped stair handrail and seating where an aisle does not serve more than five rows on one side.

303.3.22 ([F] 1104.23) Stairway floor number signs. Existing stairs shall be marked in accordance with Section 1022.8 of the *International Building Code*.

303.3.23 ([F] 1104.24) Egress path markings. Existing high-rise buildings of Group A, B, E, I, M and R-1 occupancies shall be provided with luminous egress path markings in accordance with Section 1024 of the *International Building Code*.

Exception: Open, unenclosed stairwells in historic buildings designated as historic under a state or local historic preservation program.

303.4 ([F] 1105) Requirements for outdoor operations. Outdoor operations shall be in accordance with Section 303.4.1 through 303.4.1.2.

303.4.1 ([F] 1105.1) Tire storage yards. Existing tire storage yards shall be provided with fire apparatus access roads in accordance with Sections 1105.1.1 and 1105.1.2 of the *International Building Code*.

303.4.1.1 ([F] 1105.1.1 Access to piles. Access roadways shall be within 150 feet (45 720 mm) of any point in the storage yard where storage piles are located, at least 20 feet (6096 mm) from any storage pile.

303.4.1.2 ([F] 1105.1.2) Location within piles. Fire apparatus access roads shall be located within all pile clearances identified in Section 3405.4 and within all fire breaks required in Section 3405.5 of the *International Fire Code*.

705.1 General. An area being altered within a facility that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the International Building Code unless it is technically infeasible. Where compliance with this Section is technically infeasible, the alteration shall provide access to the maximum extent that is technically feasible. Accessibility for existing buildings shall be determined as required by Section 302.1.1.

Add new standards to Chapter 16 as follows:

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 720-09 Standard for the installation of carbon monoxide(co) detection and warning equipment

UL Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096

UL 2034-08 Single and Multiple Station Carbon Monoxide Alarms with revisions through February 2009

Reason: This proposal does several things which include the following:

1. Revises the chapter title to more clearly reflect the content of the chapter
2. Restructures the requirements to more clearly point out the additional code requirements and make room for the existing minimum requirements
3. Adds some clarity on the applicable accessibility provisions
4. Places the minimum existing requirements from the fire code in the IEBC.

Title Change. The new title will make it more clear that the chapter both explains applicability and provides minimum requirements that apply to all methods of compliance.
Restructuring. Currently the additional code reference is lost at the end of the chapter. This will provide more visibility to this requirement. This also provides a better structure for future requirements such as those proposed for accessibility. In addition, it is felt that the provisions from Chapter 11 of the IFC which represent minimum existing requirements for all buildings, as applicable, should be stand alone for clarity.
Accessibility. Significant changes are being developed in the 2015 Edition of ANSI A117.1 Standard. No existing buildings have been designed to meet these standards and would be considered inaccessible under the new standard despite having complied with the 2003 standard. For example, Section 705.1.1 provides an exception for bringing an entrance into compliance if there is an accessible entrance elsewhere. A fully complying entrance under the older A117.1 would no longer be considered accessible under the new standard. Similarly, 705.2 requires the accessible route to conform where alterations are made to a primary function. Fully compliant access routes under the 2003 standard will not conform to the 2011 standard because of the changes to the minimum clearances reflecting the changed clear floor space.
With this change those elements that were compliant with the 2009 standard would continue to be considered compliant after the 2015 standard is made mandatory. This philosophy has been used with the changes in the new 2010 ADA Standard. Any existing building that conformed to the older standard is considered compliant under the new standard.
Existing requirements from IFC. Currently the IEBC only includes requirements for when an existing building is being repaired, altered or is undergoing a change of occupancy. The IFC includes minimum requirements for existing buildings in Chapter 11 that are applicable to all buildings. This change duplicates those requirements and moves them into the requirements for compliance in Chapter 3 of the IEBC so that owners and designers are aware of the additional minimums that may be imposed on an existing building beyond those required for the work anticipated. The intent is that these changes remain under the purview of the IFC Code Development Committee and are simply placed here to provide clarity to the code user that additional requirements may apply to the building if these minimums are not already met.
Changes from the IFC are only due to duplicate provisions that are already a part of the IEBC. For reference only we have included the original IFC Section number parenthetically.

- Fire code official has been revised to code official to address the fact that the authority enforcing this code may not be a fire code official.

- New Section 303.1.3 is based on IFC Section [F] 1101.3 that indicates that permits must be obtained per Sections 105.6 and 105.7 of the IFC and the IBC. The two referenced IFC Sections are not requiring permits for alterations necessary to conform, but for occupancies or systems in a building. A correction is made in this change to reference the IEBC permit requirements and a companion change is being submitted to make the same change to the IFC.

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

Analysis: The proposed referenced standards are already referenced in the *International Building Code*.

301.1-EB-COLLINS.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt that the IEBC is a construction code and adding operational requirements as found in the IFC Chapter 11 was inappropriate. Generally, the proposal was seen as too extensive and beyond the current scope and intent of the IEBC. There was some preference to the concept to instead provide a link to chapter 11 of the IFC to indicate the retroactive requirements.

Staff Analysis: This code change proposal goes beyond the scope of the IEBC by adding retroactive requirements to the code. If a public comment for approval as submitted or approval as modified is successful during the public comment hearings the result will be limited to an advisory recommendation to the ICC Board of Directors who will determine the final disposition on this proposed change.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Name: David S. Collins, The Preview Group, representing The American Institute of Architects and Robert J. Davidson, Davidson Code Concepts, LLC request Approval as Modified by this Public Comment.

Replace the proposal as follows:

CHAPTER 3
COMPLIANCE METHODS, APPLICABILITY AND MINIMUM REQUIREMENTS

301.1 General. The *repair*, *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant in addition to complying with the minimum requirements in Sections 302 and 303. Application of a method shall be the sole basis for assessing the compliance of work performed under a single permit unless otherwise approved by the *code official*. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic force-resisting system of an existing building subject to *repair*, *alteration*, *change of occupancy*, *addition* or relocation of *existing buildings*, the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

> **Exception:** Subject to the approval of the *code official*, *alterations* complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural alteration as defined in Section 907.4.3. New structural members added as part of the *alteration* shall comply with the *International Building Code*. *Alterations* of *existing buildings* in *flood hazard areas* shall comply with Section 701.3.

SECTION 302
ADDITIONAL CODES AND REQUIREMENTS

~~**301.2 Additional codes**~~ **302.1 General.** *Alterations, repairs, additions* and *changes of occupancy* to, or relocation of, *existing buildings* and structures shall comply with the provisions for *alterations, repairs, additions* and *changes of occupancy* or relocation, respectively, in this code and the *International Energy Conservation Code*, *International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code*, *International Residential Code* and NFPA 70. Where provisions of the other codes conflict with provisions of this code, the provisions of this code shall take precedence.

SECTION 303
FIRE SAFETY AND MEANS OF EGRESS REQUIREMENTS FOR EXISTING BUILDINGS

303.1 ([F] SECTION 1103) Fire safety requirements for existing buildings. Minimum fire safety requirements for existing buildings shall be in provided in accordance with Sections 303.2 through 303.10.20.

303.2 ([F] 1103.1) Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 303.2 and as further enumerated in Sections 303.3 through 303.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exception: Group U occupancies.

TABLE 303.2 ([F] TABLE 1103.1)
OCCUPANCY AND USE REQUIREMENTS[a]

SECTION	USE			OCCUPANCY CLASSIFICATION																		
	High rise	Atrium or covered mall	Under-ground building	A	B	E	F	H1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
302.7.5	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
302.7.6	R	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
302.7.7.1	R	-	R	-	-	-	-	-	-	-	-	-	R	R	R	R	-	-	-	-	-	-
302.7.7.2	R	-	R	R	R	R	R	R	R	R	R	R	-	-	-	-	R	R	R	-	R	R
302.7.7.3	R	-	R	R	R	R	R	R	R	R	R	R	-	-	-	-	R	R	R	-	R	R
302.7.7.4	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
302.7.7.5	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-
302.7.7.6	-	-	-	R		R	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
302.7.7.7	-	-	-	R		R	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
302.7.8.1	-	-	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
302.7.8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-
302.7.9.1	R	-	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	-	R	R
302.7.9.2	R	-	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	-	R	R
302.7.10.1	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
302.7.10.2	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-
302.7.10.3	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-
302.7.10.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-
302.7.10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-
302.7.10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-
302.7.10.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-
302.7.10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	R	R	R	-
302.7.11	R	-	-	-	-	-	-	-	-	-	-	-	R	R	R	R	-	R	R	R	R	-
302.7.12.4.1	R	R	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	R	R	R

a. Existing buildings shall comply with the sections identified as "Required" (R) based on occupancy classification or use, or both, whichever is applicable.
R = The building is required to comply.

303.3 ([F] 1103.2) Emergency responder radio coverage in existing buildings. Existing buildings that do not have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building, shall be equipped with such coverage according to one of the following:

1. Whenever an existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1 of the *International Fire Code*.

2. Within a time frame established by the adopting authority.

   Exception: Where it is determined by the code official that the radio coverage system is not needed.

303.4 ([F] 1103.3) Elevator operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

303.5 ([F] 1103.4) Vertical openings. Interior vertical shafts, including but not limited to stairways, elevator hoistways, service and utility shafts, that connect two or more stories of a building, shall be enclosed or protected as specified in Sections 303.5.1 through 303.5.7.

303.5.1 ([F] 1103.4.1) Group I occupancies. In Group I occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

303.5.2 ([F] 1103.4.2) Three to five stories. In other than Group I occupancies, interior vertical openings connecting three to five stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.
3. Vertical opening protection for escalators shall be in accordance with Section 303.5.5, 303.5.6 or 303.5.7.

303.5.3 ([F] 1103.4.3) More than five stories. In other than Group I occupancies, interior vertical openings connecting more than five stories shall be protected by 1-hour fire-resistance-rated construction.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.
3. Vertical opening protection for escalators shall be in accordance with Section 303.5.5, 303.5.6 or 303.5.7.

303.5.4 ([F] 1103.4.4) Atriums and covered malls. In other than Group I occupancies, interior vertical openings in a covered mall building or a building with an atrium shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.

303.5.5 ([F] 1103.4.5) Escalators in Group B and M occupancies. Escalators creating vertical openings connecting any number of stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code* installed throughout the building, with a draft curtain and closely spaced sprinklers around the escalator opening.

303.5.6 ([F] 1103.4.6) Escalators connecting four or fewer stories. In other than Group B and M occupancies, escalators creating vertical openings connecting four or fewer stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* shall be installed throughout the building, and a draft curtain with closely spaced sprinklers shall be installed around the escalator opening.

303.5.7 ([F] 1103.4.7) Escalators connecting more than four stories. In other than Group B and M occupancies, escalators creating vertical openings connecting five or more stories shall be protected by 1-hour fire-resistance-rated construction.

303.6 ([F] 1103.5) Sprinkler systems. An automatic sprinkler system shall be provided in existing buildings in accordance with Sections 303.6.1 and 303.6.2.

303.6.1 ([F] 1103.5.1) Pyroxylin plastics. An automatic sprinkler system shall be provided throughout existing buildings where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds (45 kg). Vaults located within buildings for the storage of raw pyroxylin shall be protected with an approved automatic sprinkler system capable of discharging 1.66 gallons per minute per square foot (68 L/min/m^2) over the area of the vault.

303.6.2([F] 1103.5.2) Group I-2. An automatic sprinkler system shall be provided throughout existing Group I-2 fire areas. The sprinkler system shall be provided throughout the floor where the Group I-2 occupancy is located, and in all floors between the Group I-2 occupancy and the level of exit discharge.

303.7 ([F] 1103.6) Standpipes. Where required by Sections 303.7.1 or 303.7.2, standpipes shall be installed in accordance with Section 905 of the *International Building Code*. The code official is authorized to approve the installation of manual standpipe systems to achieve compliance with this section where the responding fire department is capable of providing the required hose flow at the highest standpipe outlet.

303.7.1 ([F] 1103.6.1) Existing multiple-story buildings. Existing buildings with occupied floors located more than 50 feet (15 240 mm) above the lowest level of fire department access or more than 50 feet (15 240 mm) below the highest level of fire department access shall be equipped with standpipes.

303.7.2 ([F] 1103.6.2) Existing helistops and heliports. Existing buildings with a rooftop helistop or heliport located more than 30 feet (9144 mm) above the lowest level of fire department access to the roof level on which the helistop or heliport is located shall be equipped with standpipes in accordance with Section 905.3.6 of the *International Building Code*.

303.8 ([F] 1103.7) Fire alarm systems. An approved fire alarm system shall be installed in existing buildings and structures where required by Sections 303.8.1 through 303.8.7 and provide occupant notification in accordance with Section 907.6 of the *International Building Code* unless other requirements are provided by other sections of this code.

Exception: Occupancies with an existing, previously approved fire alarm system.

303.8.1 ([F] 1103.7.1) Group E. A fire alarm system shall be installed in existing Group E occupancies in accordance with Section 907.2.3.

Exceptions:

1. A manual fire alarm system is not required in a building with a maximum area of 1,000 square feet (93 m^2) that contains a single classroom and is located no closer than 50 feet (15 240 mm) from another building.
2. A manual fire alarm system is not required in Group E occupancies with an occupant load less than 50.

303.8.2 ([F] 1103.7.2) Group I-1. An automatic fire alarm system shall be installed in existing Group I-1 residential care/assisted living facilities in accordance with Section 907.2.6.1 of the *International Building Code*.

Exceptions:

1. Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2 of the *International Building Code* are not exceeded.
2. Where each sleeping room has a means of egress door opening directly to an exterior egress balcony that leads directly to the exits in accordance with Section 1019 of the *International Building Code*, and the building is not more than three stories in height.

303.8.3 ([F] 1103.7.3) Group I-2. An automatic fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 907.2.6.2 of the *International Building Code*..

Exception: Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2.1 of the *International Building Code* are not exceeded.

303.8.4 ([F] 1103.7.4) Group I-3. An automatic and manual fire alarm system shall be installed in existing Group I-3 occupancies in accordance with Section 907.2.6.3 of the *International Building Code*.

303.8.5 ([F] 1103.7.5) Group R-1. A fire alarm system and smoke alarms shall be installed in existing Group R-1 occupancies in accordance with Sections 303.8.5.1 through 303.8.5.2.1.

303.8.5.1 ([F] 1103.7.5.1) Group R-1 hotel and motel manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 hotels and motels more than three stories or with more than 20 sleeping units.

Exceptions:

1. Buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.
2. Manual fire alarm boxes are not required throughout the building when the following conditions are met:
   - 2.1. The building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*;
   - 2.2. The notification appliances will activate upon sprinkler water flow; and
   - 2.3. At least one manual fire alarm box is installed at an approved location.

303.8.5.1.1 ([F] 1103.7.5.1.1) Group R-1 hotel and motel automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 hotels and motels throughout all interior corridors serving sleeping rooms not equipped with an approved, supervised sprinkler system installed in accordance with Section 903 of the *International Building Code*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units and where each sleeping unit has a means of egress door opening directly to an exit or to an exterior exit access that leads directly to an exit.

303.8.5.2 ([F] 1103.7.5.2) Group R-1 boarding and rooming houses manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 boarding and rooming houses.

> **Exception**: Buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.

303.8.5.2.1 ([F] 1103.7.5.2.1) Group R-1 boarding and rooming houses automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 boarding and rooming houses throughout all interior corridors serving sleeping units not equipped with an approved, supervised sprinkler system installed in accordance with Section 903 of the *International Building Code*.

> **Exception:** Buildings equipped with single-station smoke alarms meeting or exceeding the requirements of Section 907.2.11.1 of the *International Building Code* and where the fire alarm system includes at least one manual fire alarm box per floor arranged to initiate the alarm.

303.8.6 ([F] 1103.7.6) Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 dwelling or sleeping units.

Exceptions:

1. Where each living unit is separated from other contiguous living units by fire barriers having a fire-resistance rating of not less than 0.75 hour, and where each living unit has either its own independent exit or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an approved supervised automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* and having a local alarm to notify all occupants.
3. A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*, provided that dwelling units either have a means of egress door opening directly to an exterior exit access that leads directly to the exits or are served by open-ended corridors designed in accordance with Section 1026.6, Exception 4 of the *International Building Code*.

303.8.7 ([F] 1103.7.7) Group R-4. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-4 residential care/assisted living facilities in accordance with Section 907.2.10.1 of the *International Building Code*.

Exceptions:

1. Where there are interconnected smoke alarms meeting the requirements of Section 907.2.11 of the *International Building Code* and there is at least one manual fire alarm box per floor arranged to continuously sound the smoke alarms.
2. Other manually activated, continuously sounding alarms approved by the code official.

303.8.8 ([F] 1103.8) Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be installed in existing Group I-1 and R occupancies in accordance with Sections 303.8.8.1 through 303.8.8.3.

303.8.8.1 ([F] 1103.8.1) Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*, except as provided in Sections 303.8.8.2 or 303.8.8.3.

Exceptions:

1. Where the code that was in effect at the time of construction required smoke alarms and smoke alarms complying with those requirements are already provided.
2. Where smoke alarms have been installed in occupancies and dwellings that were not required to have them at the time of construction, additional smoke alarms shall not be required provided that the existing smoke alarms comply with requirements that were in effect at the time of installation.
3. Where smoke detectors connected to a fire alarm system have been installed as a substitute for smoke alarms.

303.8.8.2 ([F] 1103.8.2) Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling or sleeping unit, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

Exceptions:

1. Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.

2. Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

303.8.8.3 ([F] 1103.8.3) Power source. Single-station smoke alarms shall receive their primary power from the building wiring provided that such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
2. Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
3. Smoke alarms are permitted to be solely battery operated in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.

303.9 ([F] 1103.9) Carbon monoxide alarms. Existing Group I or R occupancies located in a building containing a fuel-burning appliance or a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034, and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in the International Building Code, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be deemed to be an attached garage.

Exception: Sleeping units or dwelling units which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The sleeping unit or dwelling unit is located more than one story above or below any story that contains a fuel-burning appliance or an attached garage;

2. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and

3. The building is provided with a common area carbon monoxide alarm system.

303.10 ([F] 1104.1) Means of egress for existing buildings. Means of egress in existing buildings shall comply with the minimum egress requirements when specified in Table 303.2 as further enumerated in Sections 303.10.1 through 303.10.20, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 303.2 as further enumerated in Sections 303.10.1 through 303.10.20.

303.10.1 ([F] 1104.2) Elevators, escalators and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required means of egress.

Exceptions:

1. Elevators used as an accessible means of egress where allowed by Section 1007.4 of the *International Building Code*.
2. Previously approved escalators and moving walks in existing buildings.

303.10.2 ([F] 1104.3) Exit sign illumination. Exit signs shall be internally or externally illuminated. The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 footcandles (54 lux). Internally illuminated signs shall provide equivalent luminance and be listed for the purpose.

Exception: Approved self-luminous signs that provide evenly illuminated letters shall have a minimum luminance of 0.06 foot-lamberts (0.21 cd/m2).

303.10.3 ([F] 1104.5) Illumination emergency power. The power supply shall normally be provided by the premises' electrical supply. In the event of power supply failure, illumination shall be automatically provided from an emergency system for the following occupancies where such occupancies require two or more means of egress:

1. Group A having 50 or more occupants.

   Exception: Assembly occupancies used exclusively as a place of worship and having an occupant load of less than 300.

2. Group B buildings three or more stories in height, buildings with 100 or more occupants above or below a level of exit discharge serving the occupants or buildings with 1,000 or more total occupants.

3. Group E in interior stairs, corridors, windowless areas with student occupancy, shops and laboratories.

4. Group F having more than 100 occupants.

   Exception: Buildings used only during daylight hours which are provided with windows for natural light in accordance with the International Building Code.

5. Group I.

6. Group M.

   Exception: Buildings less than 3,000 square feet (279 m2) in gross sales area on one story only, excluding mezzanines.

7. Group R-1.

   Exception: Where each sleeping unit has direct access to the outside of the building at grade.

8. Group R-2.

   Exception: Where each dwelling unit or sleeping unit has direct access to the outside of the building at grade.

9. Group R-4.

   Exception: Where each sleeping unit has direct access to the outside of the building at ground level.

303.10.3.1 ([F] 1104.4) Power source. Where emergency illumination is required in Section 303.10.3, exit signs shall be visible under emergency illumination conditions.

Exception: Approved signs that provide continuous illumination independent of external power sources are not required to be connected to an emergency electrical system.

303.10.3.2 ([F] 1104.5.1) Emergency power duration and installation. In other than Group I-2, the emergency power system shall provide power for not less than 60 minutes and consist of storage batteries, unit equipment or an on-site generator. In Group I-2, the emergency power system shall provide power for not less than 90 minutes and consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 1006.3 of the *international Building Code*.

303.10.4([F] 1104.6) Guards. Guards complying with this section shall be provided at the open sides of means of egress that are more than 30 inches (762 mm) above the floor or grade below.

303.10.4.1 ([F] 1104.6.1) Height of guards. Guards shall form a protective barrier not less than 42 inches (1067 mm) high.

Exceptions:

1. Existing guards on the open side of stairs shall be not less than 30 inches (760 mm) high.
2. Existing guards within dwelling units shall be not less than 36 inches (910 mm) high.
3. Existing guards in assembly seating areas.

303.10.4.2 ([F] 1104.6.2) Opening limitations. Open guards shall have balusters or ornamental patterns such that a 6-inch-diameter (152 mm) sphere cannot pass through any opening up to a height of 34 inches (864 mm).

Exceptions:

1. At elevated walking surfaces for access to, and use of, electrical, mechanical or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches (533 mm) cannot pass through any opening.
2. In occupancies in Group I-3, F, H or S, the clear distance between intermediate rails measured at right angles to the rails shall not exceed 21 inches (533 mm).
3. Approved existing open guards.

303.10.5 ([F] 1104.7) Size of doors. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 28 inches (711 mm). Where this section requires a minimum clear width of 28 inches (711 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 28 inches (711 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. Means of egress doors in an occupancy in Group I-2 used for the movement of beds shall provide a clear width not less than 41.5 inches (1054 mm). The height of doors shall not be less than 80 inches (2032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in occupancies in Groups R-2 and R-3.
2. Door openings to storage closets less than 10 square feet (0.93 m2) in area shall not be limited by the minimum width.
3. Width of door leafs in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
4. Door openings within a dwelling unit shall not be less than 78 inches (1981 mm) in height.
5. Exterior door openings in dwelling units, other than the required exit door, shall not be less than 76 inches (1930 mm) in height.
6. Exit access doors serving a room not larger than 70 square feet (6.5 m2) shall be not less than 24 inches (610 mm) in door width.

303.10.5.1 ([F] 1104.8) Opening force for doors. The opening force for interior side-swinging doors without closers shall not exceed a 5-pound (22 N) force. For other side-swinging, sliding and folding doors, the door latch shall release when subjected to a force of not more than 15 pounds (66 N). The door shall be set in motion when subjected to a force not exceeding 30 pounds (133 N). The door shall swing to a full-open position when subjected to a force of not more than 50 pounds (222 N). Forces shall be applied to the latch side.

303.10.5.2 ([F] 1104.9) Revolving doors. Revolving doors shall comply with the following:

1. A revolving door shall not be located within 10 feet (3048 mm) of the foot or top of stairs or escalators. A dispersal area shall be provided between the stairs or escalators and the revolving doors.
2. The revolutions per minute for a revolving door shall not exceed those shown in Table 303.10.5.2.
3. Each revolving door shall have a conforming side-hinged swinging door in the same wall as the revolving door and within 10 feet (3048 mm).

Exceptions:

1. A revolving door is permitted to be used without an adjacent swinging door for street-floor elevator lobbies provided a stairway, escalator or door from other parts of the building does not discharge through the lobby and the lobby does not have any occupancy or use other than as a means of travel between elevators and a street.
2. Existing revolving doors are permitted where the number of revolving doors does not exceed the number of swinging doors within 20 feet (6096 mm).

303.10.5.2 TABLE ([F] 1104.9)
REVOLVING DOOR SPEEDS

INSIDE DIAMETER (feet-inches)	POWER-DRIVEN-TYPE SPEED CONTROL (rpm)	MANUAL-TYPE SPEED CONTROL (rpm)
6-6	11	12
7-0	10	11
7-6	9	11
8-0	9	10
8-6	8	9
9-0	8	9
9-6	7	8
10-0	7	8

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

303.10.5.2.1 ([F] 1104.9.1) Egress component. A revolving door used as a component of a means of egress shall comply with Section 303.10.5.2 and all of the following conditions:

1. Revolving doors shall not be given credit for more than 50 percent of the required egress capacity.
2. Each revolving door shall be credited with not more than a 50-person capacity.
3. Revolving doors shall be capable of being collapsed when a force of not more than 130 pounds (578 N) is applied within 3 inches (76 mm) of the outer edge of a wing.

303.10.6 ([F] 1104.10) Stair dimensions for existing stairs. Existing stairs in buildings shall be permitted to remain if the rise does not exceed 81/4 inches (210 mm) and the run is not less than 9 inches (229 mm). Existing stairs can be rebuilt.

Exception: Other stairs approved by the code official.

303.10.7 ([F] 1104.11) Winders. Existing winders shall be allowed to remain in use if they have a minimum tread depth of 6 inches (152 mm) and a minimum tread depth of 9 inches (229 mm) at a point 12 inches (305 mm) from the narrowest edge.

303.10.8 ([F] 1104.12) Circular stairways. Existing circular stairs shall be allowed to continue in use provided the minimum depth of tread is 10 inches (254 mm) and the smallest radius shall not be less than twice the width of the stairway.

303.10.9 ([F] 1104.13) Stairway handrails. Stairways shall have handrails on at least one side. Handrails shall be located so that all portions of the stairway width required for egress capacity are within 44 inches (1118 mm) of a handrail.

Exception: Aisle stairs provided with a center handrail are not required to have additional handrails.

303.10.9.1([F] 1104.13.1) Height. Handrail height, measured above stair tread nosings, shall be uniform, not less than 30 inches (762 mm) and not more than 42 inches (1067 mm).

303.10.10[F] 1104.14) Slope of ramps. Ramp runs utilized as part of a means of egress shall have a running slope not steeper than one unit vertical in 10 units horizontal (10-percent slope). The slope of other ramps shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

303.10.11 ([F] 1104.15) Width of ramps. Existing ramps are permitted to have a minimum width of 30 inches (762 mm) but not less than the width required for the number of occupants served as determined by the *International Building Code.*

303.10.12 ([F] 1104.16) Fire escape stairs. Fire escape stairs shall comply with Sections 805.3.1.2.

303.10.13 ([F] 1104.17) Corridors. Corridors serving an occupant load greater than 30 and the openings therein shall provide an effective barrier to resist the movement of smoke. Transoms, louvers, doors and other openings shall be kept closed or self-closing.

Exceptions:

1. Corridors in occupancies other than in Group H, which are equipped throughout with an approved automatic sprinkler system.
2. Patient room doors in corridors in occupancies in Group I-2 where smoke barriers are provided in accordance with the *International Building Code*.
3. Corridors in occupancies in Group E where each room utilized for instruction or assembly has at least one-half of the required means of egress doors opening directly to the exterior of the building at ground level.
4. Corridors that are in accordance with the *International Building Code*.

303.10.13.1 ([F] 1104.17.1) Corridor openings. Openings in corridor walls shall comply with the requirements of the International Building Code.

Exceptions:

1. Where 20-minute fire door assemblies are required, solid wood doors at least 1.75 inches (44 mm) thick or insulated steel doors are allowed.
2. Openings protected with fixed wire glass set in steel frames.
3. Openings covered with 0.5-inch (12.7 mm) gypsum wallboard or 0.75-inch (19.1 mm) plywood on the room side.
4. Opening protection is not required when the building is equipped throughout with an approved automatic sprinkler system.

303.10.13.2 ([F] 1104.17.2) Dead ends. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that dead ends do not exceed the limits specified in Table 303.10.13.2.

Exception: A dead-end passageway or corridor shall not be limited in length where the length of the dead-end passageway or corridor is less than 2.5 times the least width of the dead-end passageway or corridor.

303.10.13.2 TABLE ([F] 1104.17.2)
COMMON PATH, DEAD-END AND TRAVEL DISTANCE LIMITS (by occupancy)

OCCUPANCY	COMMON PATH LIMIT		DEAD-END LIMIT		TRAVEL DISTANCE LIMIT	
	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)
Group A	20/75[a]	20/75[a]	20[b]	20[b]	200	250
Group B[f]	75	100	50	50	200	300
Group E	75	100	50	50	200	300
Group F-1, S-1[d,f]	75	100	50	50	200	250
Group F-2, S-2[d,f]	75	100	50	50	300	400
Group H-1	25	25	0	0	75	75
Group H-2	50	100	0	0	75	100
Group H-3	50	100	20	20	100	150
Group H-4	75	75	20	20	150	175
Group H-5	75	75	20	50	150	200
Group I-1	75	75	20	50	200	250
Group I-2 (Health care)	NR[e]	NR[e]	NR	NR	150	200[c]
Group I-3 (Detention and correctional – Use Conditions II, III, IV, V)	100	100	NR	NR	150[c]	200[c]

Group I-4 (Day care centers)	NR	NR	20	20	200	250
Group M (Covered or open mall)	75	100	50	50	200	400
Group M (Mercantile)	75	100	50	50	200	250
Group R-1 (Hotels)	75	75	50	50	200	250
Group R-2 (Apartments)	75	125	50	50	200	250
Group R-3 (One- and two-family)	NR	NR	NR	NR	NR	NR
Group R-4 (Residential care/assisted living)	NR	NR	NR	NR	NR	NR
Group U	75	100	20	50	300	400

NR = No requirements.
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m2.

a. 20 feet for common path serving 50 or more persons; 75 feet for common path serving less than 50 persons.
b. See Section 1028.9.5 for dead-end aisles in Group A occupancies.
c. This dimension is for the total travel distance, assuming incremental portions have fully utilized their allowable maximums. For travel distance within the room, and from the room exit access door to the exit, see the appropriate occupancy chapter.
d. See the International Building Code for special requirements on spacing of doors in aircraft hangars.
e. Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet shall have at least two exit access doors placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the patient sleeping room or suite to be served, measured in a straight line between exit access doors.
f. Where a tenant space in Group B, S and U occupancies has an occupant load of not more than 30, the length of a common path of egress travel shall not be more than 100 feet.

303.10.14 F] 1104.18) Exit access travel distance. Exits shall be located so that the maximum length of exit access travel, measured from the most remote point to an approved exit along the natural and unobstructed path of egress travel, does not exceed the distances given in Table 303.10.13.2.

303.10.15 ([F] 1104.19) Common path of egress travel. The common path of egress travel shall not exceed the distances given in Table 303.10.13.2.

303.10.16 ([F] 1104.20) Stairway discharge identification. An interior exit stairway or ramp which continues below its level of exit discharge shall be arranged and marked to make the direction of egress to a public way readily identifiable.

Exception: Stairs that continue one-half story beyond their levels of exit discharge need not be provided with barriers where the exit discharge is obvious.

303.10.17 ([F] 1104.21) Exterior stairway protection. Exterior exit stairs shall be separated from the interior of the building as required in Section 1026.6 of the *International Building Code*. Openings shall be limited to those necessary for egress from normally occupied spaces.

Exceptions:

1. Separation from the interior of the building is not required for buildings that are two stories or less above grade where the level of exit discharge serving such occupancies is the first story above grade.
2. Separation from the interior of the building is not required where the exterior stairway is served by an exterior balcony that connects two remote exterior stairways or other approved exits, with a perimeter that is not less than 50 percent open. To be considered open, the opening shall be a minimum of 50 percent of the height of the enclosing wall, with the top of the opening not less than 7 feet (2134 mm) above the top of the balcony.
3. Separation from the interior of the building is not required for an exterior stairway located in a building or structure that is permitted to have unenclosed interior stairways in accordance with Section 1022 of the *International Building Code*.
4. Separation from the interior of the building is not required for exterior stairways connected to open-ended corridors, provided that:
    - 4.1. The building, including corridors and stairs, is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.
    - 4.2. The open-ended corridors comply with Section 1018.2 of the *International Building Code*.
    - 4.3. The open-ended corridors are connected on each end to an exterior exit stairway complying with Section 1026 of the *International Building Code*.
    - 4.4. At any location in an open-ended corridor where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3 m2) or an exterior stairway shall be provided.

Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.

303.10.18 ([F] 1104.22) Minimum aisle width. The minimum clear width of aisles shall be:

1. Forty-two inches (1067 mm) for aisle stairs having seating on each side.

   Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

2. Thirty-six inches (914 mm) for stepped aisles having seating on only one side.

   Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

3. Twenty inches (508 mm) between a stepped aisle handrail or guard and seating when the aisle is subdivided by the handrail.

4. Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

   Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

5. Thirty-six inches (914 mm) for level or ramped aisles having seating on only one side.

   Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

6. Twenty-three inches (584 mm) between a stepped stair handrail and seating where an aisle does not serve more than five rows on one side.

303.10.19 ([F] 1104.23) Stairway floor number signs. Existing stairs shall be marked in accordance with Section 1022.8 of the *International Building Code*.

303.10.20 ([F] 1104.24) Egress path markings. Existing high-rise buildings of Group A, B, E, I, M and R-1 occupancies shall be provided with luminous egress path markings in accordance with Section 1024 of the *International Building Code*.

Exception: Open, unenclosed stairwells in historic buildings designated as historic under a state or local historic preservation program.

Commenter's Reason: (Collins-Davidson) During testimony at the hearings in Dallas it was indicated that these provisions included requirements that weren't necessary because the reference to the IFC covered these provisions. Similar to other provisions that are found in multiple codes, these minimum requirements for existing buildings should be obvious to anyone using the code, whether they are found in the IFC or the IEBC. Users of codes should not be subject to "gotcha" provisions found in other codes that will have a significant impact on the design and use of these buildings. Worse, the application of these provisions may not occur until after the project has been permitted and or even occupied.

Also, with the modification of the ADM provision to update the A117.1 to keep the reference to the 2009 edition, the changes that the 2015 edition would have imposed on existing buildings will not have to be addressed until the 2018 edition.

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION 302
EXISTING BUILDING MINIMUM REQUIREMENTS

302.1 Required construction. Buildings undergoing repairs, alterations, changes of occupancy, additions and relocations shall comply with Chapter 11 of the International Fire Code in addition to the requirements of this Code.

Commenter's Reason: The original proposal dealt with 2 issues: accessibility and IFC Chapter 11 retroactive requirements. This public comment only addresses the second of those issues. The original proposal brought all of IFC Chapter 11 into the IEBC. However, Chapter 11's provisions are retroactive and apply even when a building is not undergoing repair, alteration, addition, change of occupancy or relocation. All of those provisions are outside the scope of the IEBC. IEBC Section 101.2 states "**101.2 Scope.** The provisions of the International Existing Building Code **shall apply to the repair, alteration, change of occupancy, addition and relocation** of existing buildings." (emphasis added)

The proponents of this code change proposal raised an important point—IFC Chapter 11 applies to all buildings, regardless of whether any work or change of occupancy is being proposed for the building. Building owners and designers may not be aware of Chapter 11, especially in jurisdictions where it is not actively enforced, but they are still obligated by law to comply with it. This proposal states that Chapter 11 provides minimum standards that apply to work within the scope of the IEBC without introducing retroactive requirements into the IEBC. This proposal would enhance enforcement of IFC Chapter 11 without exceeding the scope of the IEBC.

EB3-13

Final Action: AS AM AMPC____ D

EB5-13
504.1.1 (NEW)

Proposed Change as Submitted

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Add new text as follows:

504.1 Scope. Level 2 *alterations* include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

<u>**504.1.1** Except where aisles required in Groups B and M, table seating per Sections 1017.3 and 1017.4 of the *International Building Code* or assembly seating per Section 1028 of the *International Building Code*, are reconfigured, the movement, addition or removal of furniture, movable partitions less than 5 feet 9 inches in height, or fixtures within a space shall not be considered reconfiguration of space.</u>

Reason: Reconfiguration of a space can occur simply by movement of furniture. It isn't the intent of the IEBC to require that furniture rearrangement be included as an alteration, except where the IBC specifically limits aisles, table seating or assembly seating. By this change the rearrangement of furniture is not a trigger for application of the requirement for Level 2 Alterations.

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

504.1.1 (NEW)-EB-COLLINS.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The lead in language was confusing and the terms "shall not" were not appropriate. In addition, there was concern with the high fire hazard furniture being addressed in this exception.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David S. Collins, FAIA, The Preview Group, Inc, representing The American Institute of Architects requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

504.1.1 ~~Except where Aisles required in Groups B and M, table seating per Sections 1017.3 and 1017.4 of the *International Building Code* or assembly seating per Section 1028 of the *International Building Code*, are reconfigured, the movement, addition or removal of furniture, movable partitions less than 5 feet 9 inches in height, or fixtures within a space shall not be considered reconfiguration of space.~~

<u>The movement, addition or removal of furniture, movable partitions that are less than 5 feet 9 inches tall, measured from the floor, or where fixtures within a space are moved, shall not be considered reconfiguration of space.</u>

Movement, addition or removal of furniture and partitions shall not obstruct the minimum aisles required by the *International Building Code* in Groups B or M occupancies. Table seating shall be in accordance with Sections 1017.3 and 1017.4 of the *International Building Code* and assembly seating shall be in accordance with Section 1028 of the *International Building Code* .

Commenter's Reason: The committee felt that the language was not clear. In my zeal to not create exceptions it was difficult to understand what was intended. Hopefully, this revision will clear up the confusion, and clarify the code for users to be aware when furnishings can cause a problem that would be considered reconfiguration of space.

EB5-13
Final Action: AS AM AMPC____ D

EB6-13
505.1

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

505.1 Scope. Level 3 *alterations* apply where the *work area* exceeds 50 percent of the aggregate ~~area of the building~~ *building area* of all stories in the building.

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

This is the BCAC's attempt to clarify the scoping provisions for level 3 alterations. Some code users claim that the differing phrases used relative to area within the IEBC is confusing when those phrases are not one of the defined phrases. The BCAC believes that concern can best be addressed by referring to the defined term/phrase "building area" instead of the currently used phrase "aggregate area of the building". Because the phrase "building area" is already defined, by embedding that phrase in the modified text, the concerns of confusion and lack of consistency will be eliminated without changing the original intent. The BCAC is also aware that the current language located within IEBC Sections 410.4, 410.6, and 410.8.9 would benefit from a change to mimic the language being proposed by this code change, but cannot propose those changes at this time because those sections are located within the Group A changes. It is the intent of the BCAC to propose corresponding changes to those sections in the next code change cycle.

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

505.1-EB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies that all stories of the building are included when determining whether the alteration is considered level 3. Building area is a defined term.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

David Bonowitz, S.E, representing NCSEA Code Advisory Committee, Existing Buildings Subcommittee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

505.1 Scope. Level 3 *alterations* apply where the *work area* exceeds 50 percent of the ~~aggregate~~ *building area* ~~of all stories in the building~~.

Commenter's Reason: Here is what the proposers said in their original reason statement: "The BCAC believes that concern can best be addressed by referring to the defined term/phrase 'building area' instead of the currently used phrase 'aggregate area of the building'."

That reasoning was completely right: The code text should use the defined term. Unfortunately, the proposal as submitted does exactly the opposite of what it intends. It both fails to fix the problem of potential confusion and actually obfuscates further by using a defined term – *building area* – together with unnecessary and misleading modifiers.

First, the term *building area* is already defined in the IBC, and hence in the IEBC as well, as follows: “The area included within surrounding *exterior walls* (or *exterior walls* and *fire walls*) exclusive of vent *shafts* and *courts*. Areas of the building not provided with surrounding walls shall be included in the building area if such areas are included within the horizontal projection of the roof or floor above.”

Is it not clear that this *already* means the whole building? There is no reason to think otherwise. If EB 6 is approved as submitted, the rational user will read “aggregate building area of all stories in the building” and will wonder, “Is that different from *building area*? It must be, or else they would have just said *building area* here in 505.1.” Hence, confusion. In fact, the intended meaning of “aggregate building area of all stories in the building” is precisely the same as the already defined meaning of *building area*. There is no value or purpose to the extra words, and they should be deleted.

Second, if it is not sufficiently clear that the current definition of *building area* already means the whole building, one need only note that the IBC also already defines *floor area* as a similar term that can be applied to portions of a building.

Third, a quibble: There is no such thing as “story area” or “area of a story.” Thus, there is no such thing as the “aggregate building area of all stories.”

The code has defined terms. We should use them. Not to do so – or worse, to use them in a squishy way – negates the whole point of defining them in the first place. If *building area*, already defined, is not clear enough, then make a proposal to revise the definition, but don’t undo the definition with sloppy usage.

Public Comment 2:

David S. Collins, FAIA, The Preview Group, Inc, representing The American Institute of Architects, requests Disapproval.

Commenter’s Reason: The wording of the section is confusing. The aggregate area of stories doesn't exist in code requirements. In the IBC, the area of a story has no application, and is not defined. The aggregate area of a building includes the “building area per story,” or the allowable area multiplied by the number of stories.

Several questions would arise for users of the code by this language regarding whether the area includes light wells, shafts, etc. which have no floor, but by definition are included in the area of a building per the IBC.

EB6-13

Final Action: AS AM AMPC____ D

EB7-13
505.1

Proposed Change as Submitted

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Revise as follows:

505.1 Scope. Level 3 *alterations* ~~apply~~ include the reconfiguration of space*,* where the ~~work~~ reconfigured area exceeds 50 percent of the aggregate area of the building, and shall include the reconfiguration or extension of any system that serves more than 50 percent of the aggregate area of the building.

Reason: In a separate change the definition of "work area" is being removed from the IEBC because it's lack of specificity and the confusion it causes when used in this section. We have submitted a series of changes to provide the type of direction needed to make the code more effective. This language is proposed to provide the needed guidance in Section 505.1 for what is within the scope of a Level 3 alteration.

Cost Impact: There is no cost impact associated with this change.

505.1-EB-COLLINS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee agreed with the concept of clarifying level 3 alterations but the last portion of the proposed language seemed more extensive than intended. For instance, if a plumbing fixture such as a sink serves more than 50% of the building the movement of the sink would be considered a level 3 alteration by this revised language.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David S. Collins, FAIA, The Preview Group, Inc, representing The American Institute of Architects requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

505.1 Scope. Level 3 *alterations* include the reconfiguration of space*,* where the reconfigured area exceeds 50 percent of the aggregate area of the building~~, and shall include the reconfiguration or extension of any system that serves more than 50 percent of the aggregate area of the building.~~

Commenter's Reason: The committee felt that the last portion of the change was too expansive and perhaps wasn't what was originally intended. This change limits the scope to the portion of the building where reconfiguration exceeds 50 percent of the aggregate area of the building.

EB7-13
Final Action: AS AM AMPC____ D

EB8-13
602.3 (NEW)

Proposed Change as Submitted

Proponent: Rebecca Morley, National Center for Healthy Housing

Add new text as follows:

602.3 Moisture and Mold. Surfaces such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, shall have no signs of excessive moisture after the material has been repaired. Materials that are discolored or deteriorated by mold or mildew shall be cleaned, dried and repaired and the underlying cause shall be determined and corrected. If the material is structurally unsound it shall be removed and replaced and the underlying cause shall be determined and corrected*.*

Reason: Mold typically grows in buildings affected by water damage. According to the Institute of Medicine of the National Academies' *Damp Indoor Spaces and Health* (2004), mold and damp indoor environments are associated with asthma symptoms in sensitized persons, coughing, wheezing, and upper respiratory tract symptoms. *See www.nap.edu/books/0309091934/html/*

In December 2007, the National Center for Healthy Housing (NCHH) and the U.S. Centers for Disease Control and Prevention (CDC) convened an Expert Panel consistent with National Institute of Health guidelines to assess the effectiveness of various interventions to make homes healthier and safer. NCHH and CDC published the report of the experts in January 2009. See www.nchh.org/LinkClick.aspx?fileticket=2lvaEDNBIdU%3d&tabid=229 for the full report.

The Expert Panel reviewed five peer-reviewed research studies on the issue of mold and allergens and concluded that "when implemented together, eliminating moisture intrusion and leaks and removal of moldy items were found to be effective in reducing asthma triggers and reducing exposures." Other provisions of the IPMC address eliminating moisture intrusion. But no provisions require action on building materials with chronic moisture issues including those materials that have failed beyond repair.

This proposal implements the Expert Panel's recommendation while providing flexibility in response to actual conditions – repair for reparable material, replacement for failed material. To ensure the health of the building's occupants, mitigation of moisture problems must be a part of the code.

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

602.1-EB-MORLEY.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The term "excessive" was felt unenforceable. There was concern with what would be considered "clean." These types of provisions were felt more appropriate for the IPMC. If the requirements were felt appropriate for the IEBC they would be better located in Chapter 3.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 602
BUILDING ELEMENTS AND MATERIALS

602.1 Existing building materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to render the building or structure unsafe or *dangerous* as defined in Chapter 2.<u>Carpet, paper-faced gypsum board, and other porous material that is discolored or deteriorated by persistent moisture shall be dried and repaired, and the underlying cause of the moisture shall be corrected. If deteriorated material has decayed or failed beyond repair, it shall be removed and replaced.</u>

~~**602.3 Moisture and Mold.** Surfaces such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, shall have no signs of excessive moisture after the material has been repaired. Materials that are discolored or deteriorated by mold or mildew shall be cleaned, dried and repaired and the underlying cause shall be determined and corrected. If the material is structurally unsound it shall be removed and replaced and the underlying cause shall be determined and corrected.~~

Commenter's Reason: Elimination of moisture problems in building materials is important to ensuring the health of the building's occupants. Requiring attention to these problems when a building undergoes repair work should be a part of the code. The trigger is the repair work.

`We addressed the committee's concerns by deleting the words "cleaned" and "excessive."

EB8-13

Final Action: AS AM AMPC____ D

EB10-13
603.1, 604.1, 605.1, 703.1, 704.1

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

603.1 General. Repairs shall be done in a manner that maintains the level of fire protection provided <u>before the repair was undertaken</u>.

604.1 General. Repairs shall be done in a manner that maintains the level of protection provided for the means of egress <u>before the repair was undertaken</u>.

605.1 General. Repairs shall be done in a manner that maintains the level of accessibility <u>provided before the repair was undertaken</u>.

703.1 General. Alterations shall be done in a manner that maintains the level of fire protection provided <u>before the alteration was undertaken</u>.

704.1 General. Alterations shall be done in a manner that maintains the level of protection provided for the means of egress <u>before the alteration was undertaken</u>.

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

The current text is missing the language that tells users of the code to what level the various subjects are to be maintained. The intent that a modification should not make a condition worse than before the work started is clear. That concept is stated in IEBC sections 603.1, 604.1, 605.1, 703.1 and 704.1. By adding the proposed text to each section, that original intent is not only made clearer, it is done so in a consistent manner.

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

603.1-EB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal clarifies the language to denote to what extent to maintain the level of safety or accessibility when a repair or alteration is undertaken.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Bonowitz, S.E., representing NCSEA Code Advisory Committee, Existing Buildings Subcommittee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

603.1 General. Repairs shall be done in a manner that maintains the level of fire protection provided before the occurrence of the damage that is being repaired ~~repair was undertaken~~.

604.1 General. Repairs shall be done in a manner that maintains the level of protection provided for the means of egress before the occurrence of the damage that is being repaired ~~repair was undertaken~~.

605.1 General. Repairs shall be done in a manner that maintains the level of accessibility provided before the occurrence of the damage that is being repaired ~~repair was undertaken~~.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The modification corrects the unintended meaning of the approved wording. The approved wording talks about the condition "before the repair was undertaken." But when you think about it, the condition "before the repair was undertaken" means the condition with the damage in place. The intent of the proposal is obviously to restore the condition that existed before the damage occurred, not before the repair was started. The proposed modification thus makes more sense and better reflects the intent of the proposal.

EB10-13

Final Action: AS AM AMPC____ D

EB12-13
608.3(New), 708(New)

Proposed Change as Submitted

Proponent: Andrew Scott Jones, President, A Better Deal Heating and Air Conditioning, Inc., a Texas Corporation, representing self

Add new text as follows:

608.3 Cleanouts. Where new condensate drain lines are installed as a result of the repair, such condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

SECTION 708
MECHANICAL

708.1 Cleanouts. Where new condensate drain lines are installed as a result of a level 1 alteration, such condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

Reason: This language is identical to the language of M 32-12 which was recently adopted In Portland, Oregon. We are advised by JB Engineering that this language will be in the IMC and IPC for 2015.

Similar language has been submitted to the IRC.

Cost Impact: The code change will increase the cost of construction, totaling an estimated $15.00 per unit.

XXX-EB-JONES.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved the code change as the provisions were very specific and felt unnecessary. The concern is that adding such specific requirements would lead to a laundry list of specific requirements which was not the intent of the IEBC. Additionally, Section 301.2, which references other I-codes, currently addresses this issue.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Andrew Scott Jones, A Better Deal Heating and Air Conditioning, Inc, requests Approval as Submitted.

Commenter's Reason: The Committee Stated in response to EB12-13 that "…the provisions were very specific and felt unnecessary. …" There is a real problem with cutting clogged drain lines, as water can leak all over insulation, not to mention the time consumed in cutting, clearing the drain and repairing the cut with a collar. Eventually, the line will have to be replaced itself.

Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic or closet where the drain is located, possibly collected in a bucket or soaked up with rags or paper towels. Then the technician blows compressed air through the drain line in both directions from the cut. The cut must be repaired by resealing the drain line with a PVC coupling and solvent.

This process exposes the surrounding area to water leakage and spilling with the risk of damage, mold, spilling, as well as, the extra time and effort of carrying extra equipment, parts and flammable solvent. The process takes extra time and costs the homeowner more money.

With a device that permits the introduction of compressed air or nitrogen directly into the drain system, permitting clearing in both directions, there is no spillage of water, no cost for the couplings or solvent and no risk of water damage or mold. The entire process requires less than ten minutes.

Typically the cost of clearing a drain equipped with such a device is at least 50% less to the homeowner than the cost of clearing a blockage through the common method of cutting the pipe, attempting to collect the condensate water and repairing the cut in the drain line.

Each time a drain line is cleared through the cutting/repair process, the repair could be accomplished by installing a $15.00 line clearing device rather than a simple coupling. Drain lines can also be plumbed without installing a device at the time of installation.

Also, if clearing the drain lines were part of regular maintenance, line blockages could largely be prevented in the first place.

EB12-13

Final Action: AS AM AMPC____ D

EB15-13
702.4 (NEW), 702.5 (NEW)

Proposed Change as Submitted

Proponent: Jeff Inks, Window & Door Manufacturers Association (jinks@wdma.com)

Revise as follows:

702.1 Interior finishes. All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

702.2 Interior floor finish. New interior floor finish, including new carpeting used as an interior floor finish material, shall comply with Section 804 of the *International Building Code*.

702.3 Interior trim. All newly installed interior trim materials shall comply with Section 806 of the *International Building Code*.

702.4 Window opening control devices. In Group R-2 or R-3 buildings containing dwelling units and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by the International Building Code.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

702.5 Emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 of the *International Building Code* and Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 of the *International Residential Code* accordingly provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.

2. The replacement of the window is not part of a change of occupancy.

Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*

Reason: The intent of this proposal is to ensure window replacements meet the requirements for new construction for window fall protection and emergency escape and rescue openings when practical and avoid discouraging or preventing the replacement of windows when it is not -- provided there is no reduction in existing safety.

With respect to the proposed provisions for window opening control devices on replacement windows, they are intended to ensure window fall protection is provided where required for new construction when windows, including sash and frame, are replaced. The proposed WOCD provisions have already been approved for Chap. 4 of the IEBC (during the Group A proceedings) and are also being proposed for IRC Appendix J by us and the ICC CTC.

With respect to the proposed emergency escape and rescue opening provisions, they are based on Minnesota's residential code which actually (and effectively) incorporates them into the main body of the code in Chapter 3, under Section 310.1. The same provisions have also already been approved for Chap. 4 of the IEBC (during the Group A proceedings) and we, as well as the ICC CTC are also proposing the same provisions for IRC Appendix J (in addition to this proposal for the IEBC). Most importantly, it's important to note that the provisions do not allow for any decrease in safety and will help ensure improvements in safety can be made.

More specifically, the intent of this proposal is to ensure that the IRC does not discourage or prevent improvements in emergency escape and rescue openings, especially for fire safety, in older residential occupancies by requiring replacement windows to meet all of the provisions of Section 310 when doing so can only be accomplished by increasing the size of the rough opening or altering the interior wall.

Because many of these older buildings were constructed under codes that did not include the same emergency escape and rescue opening provisions that the IBC or IRC now require for new construction, the only way to fully meet all of the requirements of IBC Section 1029 or IRC Section 310 for new construction if required when windows are replaced, is to enlarge the rough opening and/or make significant alterations to the interior wall in order to accommodate any increase in window size or lowering of a sill.

At the very least, the significant cost and design challenges of altering the rough opening or interior wall can discourage or prevent window replacement and at worst can discourage or prevent the replacement of older windows that are harder to operate or inoperable all together because of their age or poor maintenance and, that are significantly less energy efficient. When that happens, improvements to safety as well as to energy efficiency are needlessly compromised.

Furthermore and on the whole, while some bedroom windows in older homes may not provide the full clear opening that is required for new construction or may have a sill height above 44 inches, they nonetheless still provide a viable emergency and escape rescue opening which is the primary intent of the code. Replacement of these windows with the same type of operating window or other type that can provide an equal or greater clear opening than the existing window -- even if they do not fully meet the clear opening or sill height requirements of IBC Section 1029 or IRC Section 310 accordingly – is always an improvement in safety, especially when a replacement opening can provide a larger clear opening than the existing window. Such improvements in safety should not be discouraged or prevented by overly onerous requirements for replacement windows.

This proposal will help ensure that doesn't happen by providing limited exceptions to the requirements of IBC Section 1029 and IRC Section 310 accordingly that can only be applied when certain conditions are met and that as already noted, will not result in a decrease in safety.

The requirements for new construction that emergency escape and rescue openings be provided as well as the operational requirements of IBC Section 1029 and IRC Section 310 respectively are maintained and still applicable to replacement windows.

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

702.4 (NEW)-EB-INKS.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

702.4 Window opening control devices. In Group R-2 or R-3 buildings containing dwelling units and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. In Group R-2 or R-3 buildings containing dwelling units, the top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor, or in one- and two-family dwellings and townhouses regulated by the *International Residential Code*, the top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by the *International Building Code*.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

702.5 Emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 of the *International Building Code* and Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 of the *International Residential Code* accordingly provided the replacement window ~~meets the following conditions: 1. The replacement window~~ is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
~~2. The replacement of the window is not part of a change of occupancy.~~

Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*

Committee Reason: The proposal was preferred to EB9-13. The provisions were seen necessary to address the replacement windows with regard to fall safety and emergency escape and rescue openings in existing buildings. The proposal was similar to EB9-13 but did not add revisions to Section 602.3 or one and two family dwelling. One and two family dwellings can be addressed by the IEBC. The modification adds clarification that the window opening control device requirement has a different applicability to one and two family dwellings than Group R-2 or R-3 buildings. One and two family dwellings are permitted to have a window opening as low as 24 inches above the finished floor versus 36 inches. This is more consistent with the IRC as a trigger for window opening control devices.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

702.4 Window opening control devices. In Group R-2 or R-3 buildings containing dwelling units and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. <u>One of the following applies:</u>
   - <u>3.1</u>. In Group R-2 or R-3 buildings containing dwelling units<u> regulated by the International Building Code</u>, the top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor, or
   - <u>3.2.</u> In one- and two-family dwellings and townhouses regulated by the *International Residential Code*, the top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by the *International Building Code*.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.

2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

Commenter's Reason: This is an editorial change to make item 3 clearer and easier to read.

EB15-13

Final Action: AS AM AMPC____ D

EB16-13
705 (NEW)

Proposed Change as Submitted

Proponent: Rebecca Morley, National Center for Healthy Housing

Add new text as follows:

SECTION 705
CARBON MONOXIDE ALARMS

705.1 General. Carbon monoxide alarms shall be installed in existing Group I or R occupancies in accordance with Section 1103.9 of the *International Fire Code.*

Reason: **Carbon monoxide (CO) is an odorless, tasteless, invisible gas that kills more than 300 people in homes each year. Thousands more are admitted to the hospital with carbon monoxide poisoning. This is a serious issue that affects people nationwide is all regions of the country. The International Residential Code requires CO alarms for residences with fuel-fired appliances or attached garages. This change would make the IEBC consistent with the IRC.**

The following states have required CO alarms in existing residences: Alaska, California, Colorado, Illinois, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Oklahoma, Oregon, Rhode Island, Vermont and Wisconsin. Deaths from CO are spread throughout the country as residents unwittingly use dangerous methods to stay warm in unusually cold weather.

Cost Impact: Yes, this code change proposal will increase the cost of property maintenance. A carbon monoxide alarm typically costs approximately $25.

705 (NEW)-EB-MORLEY.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal requiring CO in Group I and R occupancies was felt to be excessive with Level 1 Alteration requirements. There was also concern that this particular requirement to add CO alarms retroactively may not be applicable in all states. Note that it was pointed out that if Chapter 11 of the IFC is adopted these requirements would be applicable regardless of whether an alteration is undertaken.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jane Malone, National Center for Healthy Housing, requests Approval as Submitted.

Commenter's Reason: While not needed in jurisdictions that have adopted the *International Fire Code*, the requirement is needed for Level 1 Alterations where the IFC is not in effect.

EB16-13
Final Action: AS AM AMPC____ D

EB17-13

705.1, 905.1, 905.4 (NEW), 905.4.1 (NEW), 1005.2 (NEW), 1105 (NEW)

Proposed Change as Submitted

Proponent: Gene Boecker, Code Consultants, Inc., representing self

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasibl*e. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy. A facility shall not be altered such that the existing accessible means of egress is reduced.

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be added ~~provided~~ in existing buildings undergoing less than a level 3 alteration.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 *alteration*.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

905.1 General. The means of egress shall comply with the requirements of Section 805 except as specifically required in Sections 905.2 ~~and 905.3~~ through 905.4.

905.4 Accessible means of egress. Not less than one accessible means of egress shall be provided in accordance with Section 905.4.1 and Section 1007 of the International Building Code in alterations affecting an area containing a primary function and in additions.

Exceptions:

1. Level 1 and Level 2 alterations.
2. Historic buildings.
3. Accessible means of egress is not required to exceed 20 percent of the costs of the alterations including any costs associated with compliance for Section 410.7. Where the costs to provide accessibility cannot accommodate compliance with both this Section and Section 410.7, Section 410.7 shall take precedence.
4. Alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
5. Alterations limited solely to mechanical systems, electrical systems, installation or alteration of fire protection systems and abatement of hazardous materials.
6. Alterations undertaken for the primary purpose of increasing the accessibility of a facility.
7. Altered areas limited to Type B dwelling and sleeping units

905.4.1 Means of egress through an existing building. Where the accessible means of egress from an portion of a building being alteration or addition requires occupants to egress through portions of existing building, compliance with Section 1007 of the *International Building Code* is required through the existing building, unless technically infeasible. Where compliance with this provision is technically infeasible, the accessible means of egress through the existing building shall provide access to the maximum extent technically feasible.

1005.2 Accessible means of egress. Where a change of occupancy includes a Level 3 Alteration to an area containing a primary function, at least one accessible means of egress shall be provided in compliance with Section 905.

SECTION 1105
MEANS OF EGRESS

1105.1 General. The means of egress shall comply with the requirements of Section 905.4.1 and Chapter 10 of the *International Building Code*.

Reason: During last code change cycle, a proposal similar to this was presented. The committee felt it was too confusing and that it did not address the concept of disproportionate cost effectively. This proposal seeks to address those issues more clearly. Where possible the language was changed to be uniform among the various codes and sections.

Common sense should dictate that where major alterations occur consideration for at least one accessible means of egress should be provided. Additionally, the simple idea that an accessible means of egress should be intentionally denied to a segment of the population does not seem appropriate. As the codes now stand, a building can be completely gutted with only the facades remaining and no accessible means of egress must be provided.

It is important to remember that the new construction requirements in the IBC only require a maximum of two accessible means of egress as noted in Section 1007.1 (assuming travel distance compliance is accommodated).

With the deletion of Chapter 34 from the IBC it is incumbent on the IEBC to address these issues.

705.1: A change was made to the second exception to indicate that means of egress requirements for existing building are not required for lesser alterations, similar to exception #3.
905.1: A change is made to address the added section.
905.4: A new section is added to specifically address accessible means of egress. Rather than the blanket statement in Section 1007.1 of the building code, this section will address the scope and extent of work necessary to address accessible means of egress for existing buildings. It directs the code user to Section 1007 for the technical requirements when an accessible means of egress is necessary as well as clearly delineate that when an alteration occurs affecting an area containing a primary function, an accessible means of egress must be provided. The threshold is limited to alterations affecting a primary function because that threshold relates to the importance of changes to an area and is understood due to its relationship with the Federal accessibility regulations for the past 20 years. The intent is to provide at least one accessible means of egress.
905.4, exception #1: Alterations with some magnitude should address accessible means of egress; if the alteration is relatively small then there is reason to limit the requirement. Even if the accessible means of egress would not be a disproportionate cost (exception #2), in small alterations the area required to create the accessible means of egress may be disproportionate to the space allowed for the alteration. If so, it may "steal" too much space from an otherwise small area and would not be appropriate.
905.4, exception #2: The exception makes it clear that an accessible means of egress is not required for alterations to historic buildings. To do so, may alter the historic character. While an accessible means of egress should be provided wherever possible, the exception recognizes that in historic buildings the ability to make the necessary changes to comply may be detrimental to the historic integrity.
905.4, exception #3: Existing buildings come in all shapes and sizes and the work proposed for creating an accessible means of egress can be a small part or major portion of the effort. This exception identifies that and uses the same 20% rule for the accessible route relative to the primary use area. The exception also clarifies that where funds cannot provide the accessible route *and* an accessible means of egress, it is more important to provide the accessible route. This maintains consistency with the Federal requirements for alterations affecting an area containing a primary function.
905.4, exceptions #4, #5, #6, #7: These are the same as exceptions #2, #3, #4 and #5 in Section 705.2 for alterations affecting an area containing a primary function. These are included here for consistency.
905.4.1: If an addition is designed such that the means of egress must enter the existing building then the general rule is that the egress design in the existing building must meet the requirements for egress as it passes through the existing building. This is simply the continuation of the means of egress from the addition for egress width, panic hardware (as applicable) and similar concerns. The same should be true for the design of the accessible means of egress. If one of the accessible egress paths leads through the existing building, it too needs to meet/continue the level of protection as designed in the addition. The limitation to this is that if the effort to make the existing means of egress accessible is "technically infeasible" then work should be done to what is possible. One example of this may be making sure that the slopes along the egress path in the existing building's corridor are proper even if the width cannot be altered to allow the proper maneuverability approach to the exit door.
1005.2: A change of occupancy by itself is not sufficient to trigger the requirement for an accessible means of egress. However, if a change in occupancy also includes a Level 3 Alteration, then it should be subject to the same requirements as any other Level 3 Alteration. This provision is added as a clarification to that effect.
1105.1: Chapter 11 (Additions) does not address means of egress specifically. A reference to compliance with the means of egress provisions in Chapter 10 of the IBC is included. This is similar to the first sentence in Section 402.1 which requires additions to comply with the requirements of the IBC for new construction but more specific as is done for the "non-prescriptive" methods. The added language in inserted before the accessibility section to make it consistent with its placement in other chapters.

The codes identify the minimums necessary for life safety. These proposed changes provide the disabled community with similar levels of life safety to the general public and still sets reasonable thresholds based on the extent of work for the project. With the adoption of the new 2010 ADA Standards for Accessible Design, it is clear that the IBC will set the standard for accessible means of egress. This organization has a responsibility to act in the best interests of the general public in all its diversity. Where major changes are proposed to an existing building due to a large alteration or an addition, it should be the desire of the ICC to incorporate appropriate accessible means of egress where possible.

Cost Impact: The code change proposal will increase the cost of construction in many situations but may have no effect in others.

Cost Impact Discussion: It is not easy to address what costs could be affecting this due to the myriad possible configurations for a building. A building that is a single story at grade may have no additional cost. Because an accessible entrance would be required, it would function as the accessible means of egress. Hence, a single story building with a total internal renovation may be unaffected cost-wise by this proposal.

The main costs are those involving an elevator of adequate size on emergency standby power and a two-way communications system. If the elevator is too small, the costs to alter that would be disproportionate and it would not be required according to IEBC Section 905.4, exception #3.

At the opposite end of the spectrum could be a nine story high-rise building that is being gutted on five floors. It would be required to have an accessible route to the upper floors. The IFC would require the emergency power for fire fighter operation so that cost for that part of the accessible means of egress is covered. In that situation only the two-way communication systems costs would apply.

Buildings without elevators would likely similarly fall into the category of disproportionate costs since the addition of an elevator can be costly. Moreover, the accessible means of egress is tied into alterations that affect an area containing a primary function. This already has accessibility requirements for access such as toilet room and accessible route renovations. If the costs to add an elevator are within the 20 percent cap but the cost to add emergency standby power would be beyond the 20 percent, the exceptions in IEBC Section 905.4, exception #3 make it clear that the costs for access take precedence over the costs for egress and that combined they are not required to exceed the 20 percent figure.

In many cases the 20 percent cap will be met by the required access features and there may be no funds remaining for an accessible egress. The important thing is that we should recognize the need to provide a means of egress for all of the occupants within the building to the greatest extent possible. No definitive numbers can be provided because the variations are so many. This discussion attempts to address only the possibilities.

1007.1 #1-E-BOECKER.doc

<u>Committee Action Hearing Results</u>

Committee Action: Disapproved

Committee Reason: A similar proposal failed to be adopted in Group A and by approving this proposal would make the IBC inconsistent with the IEBC. In addition, there was concern that these provisions would be more restrictive than federal requirements. The verbiage in Section 905.4.2 is in need of editorial corrections. Also the committee felt it to be inappropriate to have level 3 alterations included in exception 2 of Section 705.1. Chapter 7 deals with level 1 alterations.

Assembly Action: None

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gene Boecker, Code Consultants, Inc, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasibl*e. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy. <u>A facility shall not be altered such that the existing accessible means of egress is reduced.</u>

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing buildings.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 *alteration*.

4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

Commenter's Reason: This is an important aspect of the proposal and did not receive any negative comments. It is reasonable to require existing facilities with accessible means of egress to maintain the accessible means of egress just like it is currently required to maintain all other aspects of the means of egress. This requires no correlation with the IBC since it is simply stating not to reduce or eliminate what is currently in place.

Public Comment 2:

Gene Boecker, Code Consultants, Inc, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasibl*e. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy. ~~A facility shall not be altered such that the existing accessible means of egress is reduced.~~

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be added to ~~in~~ existing buildings undergoing less than a level 3 alteration.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoig less than a Level 3 *alteration*.

The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

905.1 General. The means of egress shall comply with the requirements of Section 805 except as specifically required in Sections 905.2 through 905.4.

905.4 Accessible means of egress. Not less than one accessible means of egress shall be provided in accordance with Section 905.4.1 and Section 1007 of the International Building Code in alterations affecting an area containing a primary function and in additions.

Exceptions:

1. Level 1 and Level 2 alterations.
2. Historic buildings.
3. Costs to provide the accessible means of egress ~~is~~ are not required to exceed 20 percent of the costs of the alterations including any costs associated with compliance with Section 410.7. Where the costs to provide accessibility cannot accommodate compliance with both this Section and Section 410.7, Section 410.7 shall take precedence.
4. Alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
5. Alterations limited solely to mechanical systems, electrical systems, installation or alteration of fire protection systems and abatement of hazardous materials.
6. Alterations undertaken for the primary purpose of increasing the accessibility of a facility.
7. Altered areas limited to Type B dwelling and sleeping units

905.4.1 Means of egress through an existing building. Where the accessible means of egress from a portion of a building ~~being~~ alteration or addition requires occupants to egress through portions of an existing building, compliance with Section 1007 of the *International Building Code* is required through an ~~the~~ existing building for the continuation of the accessible means of egress, unless technically infeasible. Where compliance with this provision is technically infeasible, the accessible means of egress through the existing building shall provide access to the maximum extent technically feasible.

Exception: An accessible means of egress is not required from an addition through the existing building where at least one accessible means of egress is provided from the addition that is independent of the existing building.

1005.2 Accessible means of egress. Where a change of occupancy includes a Level 3 Alteration to an area containing a primary function, at least one accessible means of egress shall be provided in compliance with Section ~~905~~ 905.4.

SECTION 1105
MEANS OF EGRESS

1105.1 General. The means of egress shall comply with the requirements of Section 905.4.1 and Chapter 10 of the *International Building Code*.

Commenter's Reason: The committee and testimony raised several questions regarding the proposal. The following responds those comments and what changes have been made to the text to address those committee and testimony statements.

Group A Activity. The fact that a similar proposal failed in Group A is irrelevant to the actions by the IEBC committee (and ultimately the ICC membership). The Group A actions eventually resulted in the deletion of the technical provisions within Chapter 34 in their entirety (G201–12), deferring to the IEBC. The ICC Board of Directors has approved this action. Therefore, the reasons for disapproval of proposals in the Group A hearings are moot. It is clear that it is now entirely up to the actions within the IEBC code change activity to address issues relative to existing buildings. Therefore, the proposal must be viewed on its own merit.

IBC coordination. I have been informed by ICC staff that the provisions of exception #1 to Section 1007.1 of the IBC would be changed through a correlation committee; referring to the IEBC for direction on what to do about accessible means of egress in existing buildings. The specific language would be determined by the correlation committee.

Federal requirements for accessible means of egress. There are no technical federal requirements on this subject. The US Department of Justice, in its adoption of the 2010 ADA Standards for Accessible Design includes language that refers to the IBC for the method to address accessible means of egress. The text reads:

> ***207.1 General.*** *Means of egress shall comply with section 1003.2.13 of the International Building Code (2000 edition and 2001 Supplement) or section 1007 of the International Building Code (2003 edition) (incorporated by reference, see "Referenced Standards" in Chapter 1).*
>
> ***EXCEPTIONS: 1.*** *Where means of egress are permitted by local building or life safety codes to share a common path of egress travel, accessible means of egress shall be permitted to share a common path of egress travel.*
> ***2.*** *Areas of refuge shall not be required in detention and correctional facilities.*

Therefore, it is this body, the ICC, which bears the responsibility to determine what is necessary for means of egress for the disabled. No conflict would occur for two reasons. First, the federal requirements refer to older editions of the IBC. Second providing additional egress (stricter requirements) does not reduce the minimum of the federal provisions. As it stands, the existing federal requirements would not require accessible means of egress in existing facilities due to the reference to the older codes. The proposed change could include a requirement for accessible egress, providing added safety to those in the disabled community. In future adoptions/updates by the US DoJ they can decide whether or not to include the requirement as they have done for areas of refuge in detention and correctional facilities.

705.1, Exception #3. The committee noted that they felt it inappropriate to mention level 3 alterations in exception #2 of Section 705.1. The current exception #3 already includes reference to Level 3 alterations. It is necessary to modify the language in Chapter 7 to address the language about Level 3 alterations because the text in Section 906.1 refers back to Section 705 as the basis for what to do about accessibility. Without the reference in Chapter 7, any language in Chapter 9 to provide an accessible means of egress would be referring back to a section that would state that an accessible means of egress is not required.

905.4, Exception #3. Exception #3 is a very important one. It piggybacks onto the intent to spend up to 20% on accessibility when there is an alteration affecting a Primary Function Area. The proposal seeks to use that same 20% factor but states that it includes the costs for the accessible route. The maximum is 20%. If the accessible route in requires an expenditure of 20% then no additional funds would be needed to make an effort to provide an accessible means of egress. The obligation is met. If, 15% of the cost satisfies the need to provide a route in, then 5 percent would be available to provide an accessible means of egress. Eventually, as alterations continue, the accessible route in will require an ever-decreasing portion of the construction costs and the percentage available for the accessible means of egress will be greater. It is important to start somewhere. Even if 5% of the alteration costs would not provide an entire accessible egress route, including tactile exit signage and a two-way communications system at the elevator lobby would go a long way to increasing safety without having to add areas of refuge or revising stairways. Something is better than nothing and nothing is what we have now.

905.4.1. Language in the proposed Section 905.4.1 has been revised to address the committee's concern about grammar errors.

905.4.1 Exception. An exception was added based on feedback from public testimony. The exception clarifies the intent for a single accessible means of egress in existing buildings.

1005.2. The requirement for an accessible means of egress would not be triggered unless the change included an extensive renovation - a Level 3 Alteration. This text has not changed from the original proposal.

1105.1. The added notation makes it clear that the intent was to insert this new language and not supplant the existing text for accessibility in Additions. Other Chapters of the IEBC are organized in similar fashion. This Chapter did not include any specific reference to Means of Egress so the Section was added.

Conclusion: It is time that the ICC acts to address this condition. The provisions of building accessibility have been required on a federal level for over two decades and have been included in the legacy codes long before that. Accessible means of egress for new construction has been in the ICC for new construction since its inception and, before that, in the legacy codes. If we, as an organization, wish to address safety issues for existing buildings, we should address safety issues for all its potential occupants and not ignore that portion of the population with disabilities.

EB17-13
Final Action: AS AM AMPC____ D

EB21-13
705.1, 705.1.15 (NEW)

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through ~~705.1.14~~ 705.1.15, and Chapter 11 of the *International Building Code* unless it is *technically infeasibl*e. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible.

A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy.

Exceptions:
1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing *facilities*.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 *alteration*.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

705.1.15 Amusement rides. Where the structural or operational characteristics of an amusement ride are altered to the extent that the amusement ride's performance differs from that specified by the manufacturer or the original design, the amusement ride shall comply with requirements for new construction in the International Building Code, Section 1110.4.7.

Reason: The accessibility requirements for new construction for Amusement rides have been proposed to the IBC as part of a coordination effort with the 2010 ADA Standard for Accessible Design and 2009 ICC A117.1 Chapter 11, Recreation**.** The overall intent is to provide access to recreational facilities so that persons with mobility impairments can participate to the best of their ability. The requirements are not intended to change any essential aspects of that recreational activity.

The intent of this public comment is to match the provisions for existing amusement rides proposed and approved for IBC Chapter 34 and IEBC Chapter 4. This way the provisions for existing buildings will be consistent between Chapter 4 and 7 of the IEBC. Technical criteria can be found in the 2009 edition of the ICC A117.1, Section 1102 and includes accessible routes, load and unload areas, wheelchair spaces on rides, seats for transfer, and transfer devices.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction. This will be required by the 2010 ADA Standard for Accessible Design.

705.1-EB-BALDASSARRA-CTC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There was concern that this was not appropriate for level 1 alterations. Concerns were raised that the IEBC would begin to regulate outdoor amusement rides. Generally, there was concern that adopting these requirements for amusement rides increases the scope of the IEBC beyond that intended.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, ICC Code Technologies Committee, requests Approval as Submitted

Commenter's Reason: There was an objection at the hearings that we do not address outdoor amusement rides. Permanent amusement rides are now scoped specifically in IBC Chapter 11 (E208 -12). This includes both indoor and outdoor permanent rides; there is no distinction made in the code. Portable amusement rides are specifically exempt.

The committee was concerned over this exception being in Level I. The accessibility provisions in Level I, II and III build on each other. The text in the proposed 705.1.15 will address when the application is appropriate.

Below is the IBC text for amusement rides.

1110.4.8 Amusement rides. Amusement rides that moves persons through a fixed course within a defined area shall comply with Section 1110.4.8.1 through 1110.4.8.3.
Exception: Mobile or portable amusement rides shall not be required to be accessible.

1110.4.8.1 Load and unload areas. Load and unload areas serving amusement rides shall be accessible and be on an accessible route. Where load and unload areas have more than one loading or unloading position, at least one loading and unloading position shall be on an accessible route.

1110.4.8.1.1 Wheelchair spaces, ride seats designed for transfer, and transfer devices. Where amusement rides are in the load and unload position, the position serving a wheelchair spaces, amusement ride seats designed for transfer and transfer devices shall be on an accessible route.

1110.4.8.2 Minimum number. Amusement rides shall provide at least one wheelchair space, amusement ride seat designed for transfer, or transfer device.

Exceptions:

1. Amusement rides that are controlled or operated by the rider are not required to comply with this section.
2. Amusement rides designed primarily for children, where children are assisted on and off the ride by an adult, are not required to comply with this section.
3. Amusement rides that do not provide seats that are built-in or mechanically fastened shall not be required to comply with this section.

The proposed exception is already approved in Chapter 4 of the IEBC (section 410.8.1.5).

3411.8.15 (IEBC [B] 410.8.15) Amusement rides. Where the structural or operational characteristics of an amusement ride are altered to the extent that the amusement ride's performance differs from that specified by the manufacturer or the original design, the amusement ride shall comply with requirements for new construction in Section 1110.4.8.

Not having this in Chapter 7, would result in a conflict between chapters. The proposed text is effectively an exception that would allow one method to have a break that the other did not.

EB21-13
Final Action: AS AM AMPC____ D

<u>EB24</u>-13
803.1

<u>Proposed Change as Submitted</u>

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Revise as follows:

803.1 Scope. The requirements of this section are limited to ~~*work areas* in which Level 2 alterations are being performed, and shall apply beyond the work area where specified~~. <u>alterations per Section 504.1</u>.

Reason: Section 504.1 describes the scope of Level 2 alterations. Chapter 8 simply enumerates the items required for such alterations to conform to the code, and isn't required to restate what is included. The entire section should be eliminated, but for simplicity we are only referencing Section 504.1 for a scope, removing any conflict or confusion in the code.

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

803.1-EB-COLLINS.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Submitted**

Committee Reason: This proposal clears up redundant and potentially confusing language already addressed in Chapter 5. The proposal still provides a clear link to the scope of level 2 alterations.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Bonowitz, S.E., representing NCSEA Code Advisory Committee, Existing Buildings Subcommittee, requests Disapproval.

Commenter's Reason: The proposal as submitted would change the triggered scope of Level 2 alterations. Instead of applying in a careful way to both the intended alteration itself and other relevant areas, any triggered work would apply only to the alteration area itself.

The proposal should be disapproved for three reasons:

1. The committee's reason for approval is plainly false. It reads, in part, **"**This proposal clears up redundant and potentially confusing language already addressed in Chapter 5." Actually, there is no redundancy, because Chapter 5 merely defines the Level 2 Alteration but does not set the triggered scope of work. More important, the proposal doesn't "clear up" anything. One needs only to look at the next section to see why: "**803.2.2 Supplemental shaft and floor opening enclosure requirements.** Where the *work area* on any floor exceeds 50 percent of that floor area, the enclosure requirements of Section 803.2 shall apply to vertical openings other than stairways throughout the floor."

The provision clearly requires work "throughout the floor" – that is, even in areas *beyond the work area*. The 2012 language clearly contemplates this and gets it right. The proposal would miss this and would introduce confusion.

2. Disapproval of EB 24 is consistent with disapproval of related proposals EB 7 and EB 45. These three proposals were intended to be coordinated with the (ill-advised) removal of the key term *work area*, but they were found not to achieve their purpose. EB 24 was the first one heard at the Dallas hearings. Once EB 7 and EB 45 were disapproved, it became clear that EB 24 should have been disapproved as well.

3. EB 24 (like EB 7 and EB 45) misses the essential point of having different Alteration levels. The purpose of the levels is to allow different intended scopes of work to trigger appropriate levels of work *outside* the intended work area. The example in reason 1 above is just one of many cases where an intended alteration triggers appropriate work outside the alteration work area. Even Level 1 Alterations follow this basic IEBC philosophy (see, for example, the structural mitigation measures in section 706.) Thus, the key language that EB 24 would remove – "shall apply beyond the work area" – is vital to the *work area* concept and to the Work Area method.

EB24-13

Final Action: AS AM AMPC____ D

EB26-13
803.6 (NEW)

<u>Proposed Change as Submitted</u>

Proponent: Robert J. Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com) and David S. Collins, FAIA, The Preview Group, Inc. (dcollins@preview-group.com), representing The American Institute of Architects

Add new text as follows:

<u>**803.6 Fire-resistance ratings.** Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the *International Building Code*.</u>

<u>Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.</u>

Reason: The topic of allowing the ability to apply sprinkler protection trade-offs that exist in the current code has been a matter of discussion in the code development arena for some time. How to apply the allowance for a potential reduction in fire-resistance ratings and in what code they belong have been discussed without a consensus.

The concept is that once a building without sprinkler protection has been sprinklered throughout, whether due to renovations or retroactive code application, the designer should be permitted to allow the same fire resistance rating provisions for new construction in an existing sprinklered building. The issue is how to provide for that application of code and ensure a proper review by the building code official is performed to ensure there are no impediments to granting an approval that may result in the reduction of existing levels of protection.

This proposal attempts to provide for that process by adding a new section to the IEBC under Section 806 Building Elements and Materials. The suggested language provides that once an existing building is sprinklered throughout and meets the other fire protection requirements of Chapter 9 of the IBC, plans, investigation and evaluation reports, and other data can be submitted seeking approval of the code official for the assignment of the new fire-resistance ratings which might me a reduction, or potentially an increase.

The suggested language also requires that any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. This is to ensure special conditions are identified that may prevent a reduction in fire-resistance ratings.

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

803.6 (NEW)-EB-DAVIDSON.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Modified**

Modify the proposal as follows:

803.6 Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 <u>or 903.3.1.2</u> of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Committee Reason: The proposal was approved based upon the fact that it provides flexibility in existing buildings and encourages the installation of sprinkler systems. The proposal was preferred to F212 Part II. It was noted that it would be more consistent if this method was also allowed for the other compliance methods found in the IEBC. The modification simply recognizes this allowance for both NFPA 13 and NFPA 13R systems.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tony Crimi, A.C. Consulting Solutions Inc, representing International Firestop Council (IFC), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

803.6 Fire-resistance ratings. Where approved by the building code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code provided, the building ~~is required to meet~~ also complies with the other applicable fire protection requirements of Chapter 9 and Chapter 10 of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Commenter's Reason: This modification adds a critical element that is lacking in the current proposal. The proponents have indicated, the proposed change is intended to add minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. However, as a revision to Chapter 8 of the IEBC, this proposal will in fact apply to all buildings undergoing Level 2 alterations.

The current proposal as modified by the Committee would permit all of the sprinkler tradeoffs permitted for new construction in the IBC, even though the means of egress of the existing building have not been evaluated. If a building falls short of the IBC's requirements for means of egress (IBC Chapter 10), allowing that building to then take all of the IBC's sprinkler trade-offs and cease maintenance of fire safety features that would be traded away for sprinklers will result in reducing the level of fire safety of that existing building well below its current levels, and well below the level envisioned by the IBC. The minimum requirements of the IBC for means of egress are clearly stipulated in Chapter 10. These minimums are assumed to be in place and thus required before the sprinkler tradeoff provisions are permitted in other sections of the Code. The IBC goes as far as to state the following:

> "**1001.2 Minimum requirements.** It shall be unlawful to alter a building or structure in a manner that will reduce the number of *exits* or the capacity of the *means of egress* to less than required by this code."

By attempting to take advantage of all of the permitted reductions in fire-resistance ratings permitted by the IBC under these assumptions, this proposal needs to ensure that the base level of fire safety is also maintained. A fully adequate (safe) means of egress is an absolute bare minimum requirement. With a building already having egress deficiencies as compared to the current IBC, there should not be a possibility to further reduce fire safety features in that building.

As just one example, if an existing building had egress stairs that were narrower than the current IBC would allow, then allowing existing fire-rated egress corridors to lose their fire resistance rating could be a very detrimental loss of an essential fire safety feature for the evacuating occupants, who could be forced to wait much longer in the corridors before being able to enter the stairway.

An additional part of this Code Change Comment clarifies that the responsibility for reviewing these evaluations, which are based solely on the new construction requirements of the IBC, rests with the Building Official rather than the Fire Code Official. It is the building officials that have the training and experience to review a building for compliance to the IBC. It cannot be assumed that all Fire Official have the required knowledge of the IBC to critically evaluate a building against IBC requirements.

Public Comment 2:

William E. Koffel, P.E., Koffel Associates, Inc. representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

803.6 Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable ~~fire protection~~ requirements ~~of Chapter 9~~ of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features including fire resistance rated assemblies and smoke resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Commenter's Reason: Referring solely to Chapter 9 is problematic in that in one sense it is limiting and can infer that other provisions of the IBC need not be considered. In a similar manner, there may be requirements in Chapter 9 that are not relevant to the construction feature being evaluated. In lieu of creating a laundry list of code requirements to be met, the proposed language relies on the evaluation report addressing the issues to be considered and evaluated.

With respect to fire code deficiencies, the IEBC requires compliance with the IFC. However, as an existing building there may be some deficiencies that are existing but part of plan for correction. These should be included in the evaluation reports.

Public Comment 3:

Vickie Lovell, InterCode Inc, representing Fire Safe North America, formerly known as Alliance for Fire and Smoke Containment and Control requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

803.6 Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the International Building has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire and smoke features in Chapter 7, the fire protection requirements of Chapter 9, and the means of egress requirements in Chapter 10 of the *International Building Code* as determined by a registered design professional.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Commenter's Reason: The current proposal as modified by the committee is very limited as to how the requirements of Chapter 9 are to be applied, and very non-specific about who decides which requirements of Chapter 9 are to be applied. This modification clarifies that neither the owner nor a code or fire official can arbitrarily determine what provisions of the code should apply, but that a design professional should make the determination. The code official approves the design. It also requires that the relevant information in Chapter 7 for fire and smoke containment features and also the essential components of the means of egress in chapter 10 be considered. It is not intended to require that ALL requirements in these chapter should apply; only what is appropriate and applicable as determine by a design professional.

Public Comment 4:

Maureen Traxler, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

301.3 ~~803.6~~ Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Commenter's Reason: This modification would move the language of the proposal to Chapter 3 where it would apply to all three of the IEBC's compliance methods. The rationale for the proposal is not specific to the work area method, and we can see no reason it should not apply to the prescriptive and performance methods.

Public Comment 5:

John Williams, ICC Ad Hoc Committee on Health Care, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

803.6 Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. ~~The building is required to meet the other applicable fire protection requirements of Chapter 9 of the *International Building Code*.~~

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Reason: While the AdHoc Healthcare (AHC) committee supports this change, The AHC believes the language in the 1st paragraph needs clarification. Fire protection is addressed in IEBC Section 804. IEBC Section 803 deals with building elements and materials, a reference to Chapter 9 may be out of place here. A reference to IBC Chapter 9 could be interpreted to require pressurized stairways, fire command centers, or smoke control in other parts of the building – which have little or no effect on the fire-resistance ratings of building elements. The plans, investigation and evaluation reports required in the second in the second paragraph will provide the code official with the information needed to determine where it is reasonable to consider the requirements of the new building code.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

Public Comment 6:

Thomas S. Zaremba, Roetzel & Andress, representing Alliance of Primary Fire Rated Glazing Manufacturers, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

803.6 Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building* <u>*Code*</u> has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the *International Building Code* <u>and such other provisions of the current building code as required by the code official</u>.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. <u>Such evaluation reports shall be submitted by the applicant and the code official is authorized, without charge to the jurisdiction, to require such evaluation reports to be prepared by, or adopted by, and bear the stamp of, a registered design professional.</u>

Commenter's Reason: Three modifications to the proposal are being added to the modification made by the Committee in order to provide the code official with greater flexibility and control over the outcome of alterations involving sprinkler retrofits of existing buildings.

The first change, simply, adds the word "Code" in the first paragraph since it appears to have been inadvertently left out in the original proposal.

Second, while the original proposal provides that the "building is required to meet "the other applicable fire protection requirements of Chapter 9 of the *International Building Code*," there are provisions in other Chapters of the current building code that the code official may want the building to comply with as a condition of allowing fire-resistance ratings to meet current code. For example, although sprinklered throughout, the existing building may not be in compliance with a variety of means of egress requirements found in Chapter 10 of the current code. Without including the additional language proposed in paragraph 1, the code official would have no basis to require compliance with provisions of Chapter 10.

Third, the second paragraph of the proposal requires supporting "plans, investigation and evaluation reports and other data" to be submitted to the code official. The code official should have the option, under this paragraph, to require those supporting evaluation reports to be prepared or adopted by a registered design professional. Otherwise, the code official is tasked with verifying the accuracy and quality of the supporting evaluation reports. While there may be cases where the code official is willing to do that, the proposed modification provides the code official with the option of requiring the involvement of a registered design professional in the application process. (References to the use of registered design professionals in connection with evaluation reports such as these can be found throughout the International Codes. For example, *see* sections 104.2.1.1 and 106.1 of the *International Existing Building Code*; section 104.7.2 of the *International Fire Code*; and *section 107.3.4 of* the *International Building Code*).

I urge you to vote against the standing motion to approve as modified by the Committee, and to vote in favor of approving this proposal as modified by this Public Comment.

EB26-13

Final Action: AS AM AMPC____ D

EB29-13
804.2.2

Proposed Change as Submitted

Proponent: Dave Frable, U.S. General Services Administration Public Buildings Service (dave.frable@gsa.gov)

Revise as follows:

804.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2. In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following conditions occur:

1. The *work area* is required to be provided with automatic sprinkler protection in accordance with the *International Building Code* as applicable to new construction; and
2. The *work area* exceeds 50 percent of the floor area.

Exceptions:

1. Work areas in Group R occupancies three stories or less in height.
2. If the building does not have sufficient municipal water supply for design <u>and installation</u> of a fire sprinkler system available ~~to the floor without installation of a new fire pump,~~ <u>at the site</u> *work areas* shall be protected by an automatic smoke detection system throughout all occupiable spaces other than sleeping units or individual dwelling units that activates the occupant notification system in accordance with Sections 907.4, 907.5 and 907.6 of the *International Building Code*.

Reason: The intent of this code change is to attempt to address a concern that the municipal water supply must be available at the floor where the work area is located without the installation of a new fire pump. This code change revises the subject text such that if a municipal water supply is available at the building site, and the work area exceeds 50% of the floor area, the installation of a new fire pump if needed to supplement the necessary flow and pressure for the sprinkler system should not be the deciding factor to address the need to increase the current degree of public safety in existing buildings.

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

804.2.2-EB-FRABLE.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The current allowance that would not require automatic sprinkler installation if a pump was required was felt inappropriate. Instead it was felt that the requirement for the installation of automatic sprinklers should be based upon the availability of onsite water.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and a public comment was submitted.

Public Comment:

Steven Orlowski, National Association of Home Builders, requests Disapproval.

Commenter's Reason: We disagree with the committee's action to remove the long standing exception that dates back to the 2000 IEBC. There has always been an understanding that there needs to be a sense of rational in applying new construction requirements to existing building, especially code provisions which would have a significant impact on the reuse or cost of altering an existing building. To now require level II alterations where the work area exceeds 50% of a floor to install a suppressions system and possibly an additional water lateral, emergency power source, fire pump and the protection of the fire pump is disproportional to the type of alteration taking place. In many cases, to sprinkler what could amount to be a very small portion of a building is regressive in that the added cost imposed by this modification may well become disproportionate to the protection provided and to the value of the building. We encourage the assembly to overturn the committee's action and reinstate the exception.

EB29-13
Final Action: AS AM AMPC____ D

EB30-13
804.2.3

Proposed Change as Submitted

Proponent: Dave Frable, U.S. General Services Administration, Public Buildings Service (dave.frable@gsa.gov)

Revise as follows:

804.2.3 Windowless stories. Work located in a windowless story, as determined in accordance with the *International Building Code*, shall be sprinklered where the *work area* is required to be sprinklered under the provisions of the *International Building Code* for newly constructed buildings and the building has a sufficient municipal water supply ~~without installation of a new fire pump~~ for design and installation of a fire sprinkler system available at the site.

Reason: The intent of this code change is to attempt to address a concern that the municipal water supply must be available at the floor where the work area is located without the installation of a new fire pump. This code change revises the subject text such that if a municipal water supply is available at the building site, and the work area exceeds 50% of the floor area, the installation of a new fire pump if needed to supplement the necessary flow and pressure for the sprinkler system should not be the deciding factor to address the need to increase the current degree of public safety in existing windowless buildings.

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

804.2.3-EB-FRABLE.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposal based upon the action taken on EB29-12.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved.

EB32-13
804.2.4

Proposed Change as Submitted

Proponent: Dave Frable, U.S. General Services Administration Public Buildings Service (dave.frable@gsa.gov)

Revise as follows:

804.2.4 Other required automatic sprinkler systems. In buildings and areas listed in Table 903.2.11.6 of the *International Building Code*, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with an automatic sprinkler system under the following conditions:

1. The *work area* is required to be provided with an automatic sprinkler system in accordance with the *International Building Code* applicable to new construction; and
2. The building has sufficient municipal water supply for design and installation of an automatic sprinkler system available ~~to the floor without installation of a new fire pump~~. at the site.

Reason: The intent of this code change is to attempt to address a concern that the municipal water supply must be available at the floor where the work area is located without the installation of a new fire pump. This code change revises the subject text such that if a municipal water supply is available at the building site, and the work area exceeds 50% of the floor area, the installation of a new fire pump if needed to supplement the necessary flow and pressure for the sprinkler system should not be the deciding factor to address the need to increase the current degree of public safety in existing buildings.

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

804.2.4-EB-FRABLE.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposal based upon the action taken on EB29-12.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved.

EB33-13
804.4.1.3

Proposed Change as Submitted

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare (John.Williams@DOH.WA.GOV) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

804.4.1 Occupancy requirements. A fire alarm system shall be installed in accordance with Sections 804.4.1.1 through 804.4.1.7. Existing alarm-notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm-notification appliances within the *work area* shall be provided and automatically activated.

Exceptions:

1. Occupancies with an existing, previously approved fire alarm system.
2. Where selective notification is permitted, alarm notification appliances shall be automatically activated in the areas selected.

804.4.1.3 Group I-2. A fire alarm system shall be installed in work areas of Group I-2 occupancies as required by the International Fire Code for ~~existing~~ new Group I-2 occupancies.

Reason: This proposed change is a joint proposal from the ICC Ad Hoc Committee on Healthcare (AHC) and the Code Technology Committee (CTC). The scope of the AHC deals with Group I-2 hospitals (now Group I-2 Condition 2 as a result of approved code change G257-12) and the scope of the CTC's investigation of the area of study entitled "Care Facilities" addresses Group I-1 and Group I-2 Condition 1 (nursing homes).

This section in the IEBC refers you to the IFC for fire alarm requirements in existing buildings undergoing a Level 2 Alteration. Section 1103.7.3 of the IFC refers back to the new construction requirements of Section 907.2.6.2. This proposal removes the circuitous references by stipulating that the fire alarm system needs to be installed as required for new construction.

This is a joint proposal submitted by the ICC Ad Hoc Committee for Healthcare and the ICC Code Technology Committee.

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

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

804.4.1.3-EB-BALDASSARRA-WILLIAMS-ADHOC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal was felt to conflict with the IFC for existing Group I-2 occupancies. Other concerns related to the fact that this provision should be dealt with in the change of occupancy requirements for new installations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, request Approval as Modified by this Public Comment.

Replace the proposal as follows:

804.4.1 Occupancy requirements. A fire alarm system shall be installed in accordance with Sections 804.4.1.1 through 804.4.1.7. Existing alarm-notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm-notification appliances within the *work area* shall be provided and automatically activated.

Exceptions:

1. Occupancies with an existing, previously approved fire alarm system.
2. Where selective notification is permitted, alarm notification appliances shall be automatically activated in the areas selected.

804.4.1.3 Group I-2. A fire alarm system shall be installed ~~in work areas of~~ <u>throughout</u> Group I-2 occupancies as required by the International Fire Code ~~for existing Group I-2 occupancies~~.

Commenter's Reason: The proposal was not intended to address new vs. existing occupancies. The intent is to send the designer to the correct location for fire alarms as required in IFC and maintaining correlation in the codes. Section 804.4.1 could be confusing for designers. Fire Codes and CMS require fire alarms throughout a Group I-2 already. See IFC Section 907.2.6.2 reprinted below. By virtue of this reference the difference is that you will pick up manual fire alarm pull stations. Note that the existing requirements in Section 1103.7 would permit a previously approved fire alarm system to remain. Whereas, this proposed language would require the fire alarm system to be upgraded to new standards based on rehabilitation work.

907.2.6.2 Group I-2. An automatic smoke detection system shall be installed in *corridors* in nursing homes, long-term care facilities, detoxification facilities and spaces permitted to be open to the *corridors* by Section 407.2 of the *International Building Code*. The system shall be activated in accordance with Section 907.5. Hospitals shall be equipped with smoke detection as required in Section 407 of the *International Building Code*.

Exceptions:

1. *Corridor* smoke detection is not required in smoke compartments that contain *sleeping units* where such units are provided with smoke detectors that comply with UL 268. Such detectors shall provide a visual display on the *corridor* side of each *sleeping unit* and shall provide an audible and visual alarm at the care provider station attending each unit.
2. *Corridor* smoke detection is not required in smoke compartments that contain *sleeping units* where *sleeping unit* doors are equipped with automatic door-closing devices with integral smoke detectors on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.

EB33-13

Final Action: AS AM AMPC____ D

EB35-13
805.3.1.1

Proposed Change as Submitted

Proponent: Steve Thomas, Colorado Code Consulting, LLC (sthomas@coloradocode.net)

Revise as follows:

805.3.1.1 Single-exit buildings. Only one exit is required from buildings and spaces of the following occupancies:

1. In Group A, B, E, F, M, U and S occupancies, a single exit is permitted in the story at the level of exit discharge when the occupant load of the story does not exceed 50 and the exit access travel distance does not exceed 75 feet (22 860 mm).
2. Group B, F-2, and S-2 occupancies not more than two stories in height that are not greater than 3,500 square feet per floor (326 m^2), when the exit access travel distance does not exceed 75 feet (22 860 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.
3. Open parking structures where vehicles are mechanically parked.
4. In community residences for the developmentally disabled, the maximum occupant load excluding staff is 12.
5. Groups R-1 and R-2 not more than ~~two~~ three stories in height, when there are not more than four dwelling units per floor and the exit access travel distance does not exceed ~~50~~ 125 feet (~~15 240 mm~~ 38,100 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour. Each dwelling unit shall be provided with emergency escape and rescue openings in accordance with Section 1029 of the *International Building Code*.

(Portions of text not shown remain unchanged)

Reason: This change is intended to create consistency between the IEBC and the IBC. The travel distances for Group R-2 occupancies in Table 1021.2(1) were changed in the 2012 IBC. This change is consistent with that change. It eliminates any potential conflicts between the codes. We have also added the requirement for emergency escape and rescue openings to the section to be consistent with the footnote a of IBC Table 1021.2(1) for consistency as well.

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

805.3.1.1-EB-THOMAS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved due to the concern with the increase in stories from two to three. This exception as currently written is for both sprinklered and non sprinklered buildings. Similar provisions in the IBC would require automatic sprinklers.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

805.3.1.1 Single-exit buildings. Only one exit is required from buildings and spaces of the following occupancies:

1. In Group A, B, E, F, M, U and S occupancies, a single exit is permitted in the story at the level of exit discharge when the occupant load of the story does not exceed 50 and the exit access travel distance does not exceed 75 feet (22 860 mm).

2. Group B, F-2, and S-2 occupancies not more than two stories in height that are not greater than 3,500 square feet per floor (326 m2), when the exit access travel distance does not exceed 75 feet (22 860 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.

3. Open parking structures where vehicles are mechanically parked.

4. In community residences for the developmentally disabled, the maximum occupant load excluding staff is 12.

5. Groups R-1 and R-2 not more than two stories in height, when there are not more than four dwelling units per floor and the exit access travel distance does not exceed 50 feet (15 240 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.

<u>6. Group R-2 occupancies not more than three stories in height which comply with all of the following:</u>

<u>6.1. There are not more than four dwelling units per story</u>
<u>6.2. The building is provided with a fire sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code.*</u>
<u>6.3 The exit access travel distance from each dwelling unit to an approved exit does not exceed 125 feet (15,240 mm).</u>
<u>6.4 Each dwelling unit shall be provided with emergency escape and rescue openings in accordance with Section 1029 of the International Building Code.</u>

Commenter's Reason: The committee had concerns with the revision increasing the number of stories in the section and the lack of sprinkler requirements. Our intent was to provide consistency with the International Building Code (IBC). Therefore, we are proposing that we replace the original proposal with the language above. The current language in Item 5 of Section 805.3.1.1 is not being revised. We are adding an additional item to the section that coincides with the current language in the IBC Table 1021.2(1). This proposal eliminates any potential conflicts between the IBC and IEBC.

EB35-13
Final Action: AS AM AMPC____ D

EB38-13
805.6

<u>Proposed Change as Submitted</u>

Proponent: Gerald Anderson, City of Overland Park, Kansas (jerry.anderson@opkansas.org)

Revise as follows:

805.6 Dead-end corridors. Dead-end corridors in any *work area* <u>created as a result of the alteration</u> shall not exceed ~~35~~ <u>20</u> feet (6096 mm).<u>Existing dead-end corridors in any work area shall not exceed 35 feet (10 670 mm).</u>

Exceptions:

1. Where dead-end corridors of greater length are permitted by the *International Building Code*.
2. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 50 feet (15 240 mm) in buildings equipped throughout with an automatic fire alarm system installed in accordance with the *International Building Code*.
3. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 70 feet (21 356 mm) in buildings equipped throughout with an automatic sprinkler system installed in accordance with the *International Building Code*.
4. In other than Group A and H occupancies, the maximum length of an existing, newly constructed, or extended dead-end corridor shall not exceed 50 feet (15 240 mm) on floors equipped with an automatic sprinkler system installed in accordance with the *International Building Code*.

Reason: The intent of the code change is to make the base requirement for the allowable length of a dead-end corridor to be the same as the International Building code. The IBC limits dead-end corridors to 20 feet. The new wording will continue to make allowances for existing situations where existing dead-end corridor are found to be 35 feet length or less in length. It seems terribly inconsistent to require dead-end corridors on new construction be limited to 20 feet, and then yet allow for an alteration with a 35 foot dead end corridor.

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

805.6-EB-ANDERSON

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee understood the concerns raised by the proposal but as currently written may be difficult to apply and would be inconsistent with the IBC. It was encouraged that more work occur on the proposal in the form of a public comment. One particular concern raised was dealing with a newly constructed corridor in an existing building that due to the layout of the building could not meet the 20 foot requirement in a practical way.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gerald Anderson, City of Overland Park, Kansas, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

805.6 Dead-end corridors. <u>Existing</u> dead-end corridors in any *work area* shall not exceed 35 feet (6096 mm).

Exceptions:

1. Where dead-end corridors of greater length are permitted by the *International Building Code*.
2. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 50 feet (15 240 mm) in buildings equipped throughout with an automatic fire alarm system installed in accordance with the *International Building Code*.
3. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 70 feet (21 356 mm) in buildings equipped throughout with an automatic sprinkler system installed in accordance with the *International Building Code*.
4. In other than Group A and H occupancies, the maximum length of an existing, newly constructed, or extended dead-end corridor shall not exceed 50 feet (15 240 mm) on floors equipped with an automatic sprinkler system installed in accordance with the *International Building Code*.

Commenter's Reason: The purpose of the code change is to clarify what I believe is the intent of the code. The current language can be read to as allow for construction of dead end corridors 35 ft in length. That reading of the code would be in conflict with the IBC which limits dead-end corridors to 20 feet. By adding the word 'existing" the code would still will make allowances for existing situations where existing dead-end corridor are found to be 35 feet length or less in length but would not allow for the construction of a dead end corridor in excess of that allowed by the IBC.

This is a much needed change. It seems terribly inconsistent to restrict dead-end corridors in new construction to 20 feet, and then turn around and allow the construction of a 35 foot dead end corridor when the IEBC is used.

EB38-13

Final Action: AS AM AMPC____ D

EB42-13
806.2

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

806.2 Stairs and escalators in existing buildings. In *alterations* where an escalator or stair is added where none existed previously, an accessible route shall be provided in accordance with ~~Sections~~ Section 1104.4 ~~and 1104.5~~ of the *International Building Code*.

Reason: The intent of this provisions is that the accessible route will be permitted to be provided in the same area as the new construction, and is not require it to be located elsewhere in the building. A reference to Section 1104.5 could require the accessible route to be provided in another part of the building is the new stairway was not on a general circulation route. A correlative change has been proposed and approved for IBC Section 3411.8.4/IEBC 410.8.4.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

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

806.2-EB-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There were concerns that without the reference to Section 1104.5 the route could potentially be located outside the building which was inappropriate.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, ICC Code Technologies Committee, requests Approval as Submitted.

Commenter's Reason: The requirement in Section 1104.5 for a "general" circulation path location (Section 1104.5) could require the accessible route to be constructed considerably outside of the work area. Therefore, the intent of the deletion of the reference to Section 1104.5 is to allow for the vertical route, typically an elevator or platform lift, to be installed within the area of alteration, rather than possibly requiring the route somewhere else in the building. This would allow design flexibility and options.

Also, this language is currently in IEBC Section 410.8.4. The revision was approved in G241-12. This needs to be approved for correlation in the code. 2015 text is below.

IBC 1104.5 Location. *Accessible routes* shall coincide with or be located in the same area as a <u>general</u> *circulation path*. Where the *circulation path* is interior, the *accessible route* shall also be interior. Where only one *accessible route* is provided, the *accessible route* shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.

Exceptions:

1. *Accessible routes* from parking garages contained within and serving *Type B units* are not required to be interior.
2. A single *accessible route* is permitted to pass through a kitchen or storage room in an *Accessible unit*, *Type A unit* or *Type B unit*.

IEBC 410.8.4 Stairs and escalators in existing buildings. In *alterations* where an escalator or stair is added where none existed previously, an accessible route shall be provided in accordance with Section 1104.4 of the *International Building Code*.

EB42-13
Final Action: AS AM AMPC____ D

EB43-13
806.3, 806.4, 806.5, 906.2

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

~~806.3~~ 1105.2 Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of spaces being added.

~~806.4~~ 1105.3 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

~~806.5~~ 1105.4 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

906.2 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered ~~or added~~, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered ~~or added~~.

Reason: The intent of this change is to clarify when Accessible, Type A and Type B units are required in alterations and additions.

Units being added within an existing structure are considered an alteration; therefore, Accessible and Type A units that are added as part of a renovation are adequately addressed in Section 705.1.8 and 705.1.9, and the language in 806.3 and 806.4 is not needed.

Additions adjacent to or above a building must comply with new construction. Therefore, Section 806.3, 806.4 and 806.5 should be relocated to Section 1105. This clarifies that just the addition is considered for the number of units, not the addition plus the number of existing units. Section 705.1.14, Extent of application, would allow for a situation where Accessible and Type A units were provided in sufficient numbers, including the addition, in the existing building.

Type B units are currently required in existing building undergoing a Level 3 alteration, with or without a change of occupancy. This requirement will remain the same (see Section 705.1, Exception 3, Section 906.2 and the exception to Section 1012.8).

For reference these are the related sections with revisions included.

Level I Alterations

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasibl*e. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy.

Exceptions:
1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing *facilities*.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 *alteration*.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

705.1.8 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

705.1.9 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

Level II Alterations

806.1 General. A building, *facility*, or element that is altered shall comply with this section and Section 705.

Level III Alterations

906.1 General. A building, *facility* or element that is altered shall comply with this section and Sections 705 and 806.

906.2 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered ~~or added~~, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered ~~or added~~.

Change of Occupancy

1006.1 General. Accessibility in portions of buildings undergoing a *change of occupancy* classification shall comply with Section 1012.8.

1012.8 Accessibility. *Existing buildings* that undergo a change of group or occupancy classification shall comply with this section.

> **Exception:** Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing buildings and facilities undergoing a *change of occupancy* in conjunction with less than a Level 3 *alteration*.

Additions

1105.1 Minimum requirements. Accessibility provisions for new construction shall apply to additions. An addition that affects the accessibility to, or contains an area of, *primary function* shall comply with the requirements of Sections 705, 806 and 906, as applicable.

<u>1105.2</u> ~~806.3~~ Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of spaces being added.

<u>1105.3</u> ~~806.4~~ Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

<u>1105.4</u> ~~806.5~~ Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

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

906.2-EB-BALDASSARRA-CTC.doc

<u>Committee Action Hearing Results</u>

Committee Action: Disapproved

Committee Reason: There was concern that moving these requirements to the chapter on additions would create a potential gap in the IEBC for Accessible, Type A and Type B dwelling and sleeping units.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, ICC Code Technologies Committee, requests Approval as Submitted.

Commenter's Reason: The IEBC development committee felt that there was a possible gap in the requirements for accessible units. The CTC carefully reviewed the proposal to identify any gaps and found none. The CTC committee felt that this change would not create a gap in the provisions, but would clarify what happens with additions. Where units are added as part of an addition, should be addressed in the IEBC Chapter on additions, not in the chapter for Level 2 alterations. Section 1105.4 for Type B units is consistent with Fair Housing Requirements and is part of the safe harbor evaluation.

Dwelling and sleeping units added within a building as part of change of occupancy are alterations and will addressed in the current text in Level I for Accessible and Type A and Level III for Type B.

This is how the language would be related in the IEBC –

Level I Alterations

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasibl*e. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy.

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing *facilities*.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 *alteration*.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

705.1.8 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

705.1.9 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

Level II Alterations

806.1 General. A building, *facility*, or element that is altered shall comply with this section and Section 705.

Level III Alterations

906.1 General. A building, *facility* or element that is altered shall comply with this section and Sections 705 and 806.

906.2 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered ~~or added~~, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered ~~or added~~.

Change of Occupancy

1006.1 General. Accessibility in portions of buildings undergoing a *change of occupancy* classification shall comply with Section 1012.8.

1012.8 Accessibility. *Existing buildings* that undergo a change of group or occupancy classification shall comply with this section.

Exception: Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing buildings and facilities undergoing a *change of occupancy* in conjunction with less than a Level 3 *alteration*.

Additions

1105.1 Minimum requirements. Accessibility provisions for new construction shall apply to additions. An addition that affects the accessibility to, or contains an area of, *primary function* shall comply with the requirements of Sections 705, 806 and 906, as applicable.

1105.2 ~~806.3~~ Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of spaces being added.

1105.3 ~~806.4~~ Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

1105.4 ~~806.5~~ Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

EB43-13
Final Action: AS AM AMPC____ D

EB45-13
901.2, 903.2.1, 903.3

Proposed Change as Submitted

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Revise as follows:

901.2 Compliance. In addition to the provisions of this chapter, work shall comply with all of the requirements of Chapters 7 and 8. The requirements of Sections 803, 804 and 805 shall apply ~~within all *work areas*~~ to all Level 3 alteration work per Section 505.1, whether or not they include exits and corridors shared by more than one tenant and regardless of the occupant load.

> **Exception:** Buildings in which the reconfiguration of space affecting exits or shared egress access is exclusively the result of compliance with the accessibility requirements of Section 705.2 shall not be required to comply with this chapter.

903.2.1 Separation required. Where the ~~*work area*~~ Level 3 alteration work is in any attached dwelling unit in Group R-3 or any multiple single-family dwelling (townhouse), walls separating the dwelling units that are not continuous from the foundation to the underside of the roof sheathing shall be constructed to provide a continuous fire separation using construction materials consistent with the existing wall or complying with the requirements for new structures. All work shall be performed on the side of the dwelling unit wall that is part of the *work area*.

> **Exception:** Where *alterations* or *repairs* do not result in the removal of wall or ceiling finishes exposing the structure, walls are not required to be continuous through concealed floor spaces.

903.3 Interior finish. Interior finish in exits serving the ~~*work area*~~ Level 3 alterations shall comply with Section 803.4 between the highest floor on which there is ~~a *work area*~~ an *alteration* to the floor of exit discharge.

Reason: This change is part of the package of changes to help clarify how alteration work is described and within what limitations they are to be applied. Section 505.1 will include the limitations for the 50 percent reconfiguration of space, along with the reconfiguration or extension of systems that serve more than 50 percent of the space in a building.

Cost Impact: The code change proposal will not increase the cost of construction. This will lower the cost of construction by eliminating confusion.

901.2-EB-COLLINS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee understood the concerns with the term and definition of "work area" but this particular strategy of stating "level 3 alteration" was not felt to solve the problem.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David S. Collins, FAIA, The Preview Group, Inc. representing The American Institute of Architects, requests Approval as Submitted.

Commenter's Reason: EB24 was passed for level 2 alterations, removing the unnecessary and confusing terminology of work area from the IEBC, this change would coordinate those changes for the level 3 alterations

EB45-13

Final Action: AS AM AMPC____ D

EB46-13
902.2, 902.2.1

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

902.2 Boiler and furnace equipment rooms. Boiler and furnace equipment rooms adjacent to or within Groups I-1, I-2, I-4, R-1, R-2 and R-4 occupancies ~~the following facilities~~ shall be enclosed by 1-hour fire-resistance-rated construction: ~~day nurseries, children's shelter facilities, residential childcare facilities, and similar facilities with children below the age of 21/2 years or that are classified as Group I-2 occupancies, shelter facilities, residences for the developmentally disabled, group homes, teaching family homes, transitional living homes, rooming and boarding houses, hotels, and multiple dwellings~~ .

Exceptions:

1. ~~Furnace and~~ Steam boiler equipment ~~of low-pressure type,~~ operating at pressures of 15 pounds per square inch gauge (psig) (103.4 KPa) or less ~~for steam equipment or~~ is not required to be enclosed.
2. Hot water boilers operating at pressures of 170 psig (1171 KPa) or less ~~for hot water equipment, when installed in accordance with manufacturer recommendations~~ are not required to be enclosed.
3. ~~2.~~ Furnace and boiler equipment ~~of residential R-3 type~~ with ~~200,000~~ 400,000 British thermal units (Btu) (~~2.11~~ 4.22 × 108 J) per hour input rating or less is not required to be enclosed.
4. ~~3.~~ Furnace rooms protected with automatic ~~sprinkler protection~~ fire-extinguishing system are not required to be enclosed.

~~**902.2.1 Emergency controls.** Emergency controls for boilers and furnace equipment shall be provided in accordance with the *International Mechanical Code* in all buildings classified as day nurseries, children's shelter facilities, residential childcare facilities, and similar facilities with children below the age of 21/2 years or that are classified as Group I-2 occupancies, and in group homes, teaching family homes, and supervised transitional living homes in accordance with the following:~~

1. ~~Emergency shutoff switches for furnaces and boilers in basements shall be located at the top of the stairs leading to the basement; and~~
2. ~~Emergency shutoff switches for furnaces and boilers in other enclosed rooms shall be located outside of such room.~~

Reason: The list of occupancies is outdated and unclear in both Section 902.2 and 902.2.1. The exceptions in 902.2 should be consistent with IBC Table 508.2.5 for new construction, not have a much lower threshold for renovations versus new. The remainder of the revisions is a clarification of the existing language. Emergency controls for boilers and furnace equipment is never required in the IMC, so Section 902.2.1 should be deleted.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

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

902.2-EB-BALDASSARRA-CTC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal was approved as it fixes out dated descriptions of occupancies that are now clearly addressed by the IBC. These revisions were felt to make application of the I-Codes more consistent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Hugo, CBO, National Fire Sprinkler Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

902.2 Boiler and furnace equipment rooms. Boiler and furnace equipment rooms adjacent to or within Groups I-1, I-2, I-4, R-1, R-2 and R-4 occupancies shall be enclosed by 1-hour fire-resistance-rated construction:

Exceptions:

1. Steam boiler equipment operating at pressures of 15 pounds per square inch gauge (psig) (103.4 KPa) or less or is not required to be enclosed.
2. Hot water boilers operating at pressures of 170 psig (1171 KPa) or less are not required to be enclosed.
3. Furnace and boiler equipment of with 400,000 British thermal units (Btu) (4.22 × 108 J) per hour input rating or less is not required to be enclosed.
4. Furnace rooms protected with an automatic sprinkler ~~fire-extinguishing~~ system are not required to be enclosed.

Commenter's Reason: The term "automatic sprinkler system" is consistent with Table 509 (or Table 508.2 in 2009 IBC).

EB46-13

Final Action:	AS	AM	AMPC____	D

EB49-13
904.2

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

904.2 Fire alarm and detection systems. Fire alarm and detection systems ~~complying with Sections 804.4.1 and 804.4.3~~ shall be provided ~~throughout the building~~ in accordance with <u>Section 907 of</u> the *International Building Code* <u>as required for new construction</u>.

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

The reference back to Section 804.4.1 through 804.4.3 misses critical upgrades of alarm systems for other occupancies. The intent of this proposal is to eliminate the reference to Chapter 8 of the IEBC because the reference creates confusion. Section 904.2.1 implies that an alarm system for all occupancies in accordance with the IBC would be required, however the reference to Section 804.4 implies that only those occupancies found in Section 804.4 are required to have them installed. Section 804.4 does not cover the fire alarm requirements for all occupancies in the IBC. An alteration level 3 to an existing A occupancy is a significant change to more than 50% of the area of a building and an alarm system would not be required with the current reference to Section 804.4 left in the code.

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

904.2-EB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the proposal based upon the proponent's reason. In addition, it was noted that level 3 alterations were substantial enough and fire alarm systems should be as required for new construction.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

904.2 Fire alarm and detection systems. Fire alarm and detection systems shall be provided <u>throughout the building</u> in accordance with Section 907 of the *International Building Code* as required for new construction.

Commenter's Reason: We are proposing to reinsert the phrase "throughout the building" into this code section because it clarifies that the requirements for fire alarm systems are not limited to the work area. Section 904.2 of the 2012 IEBC requires alarms throughout, but the rest of Chapter 9 applies either to the work area only or to areas from the work area to the level of exit discharge. The phrase "as required for new construction" clarifies that "throughout the building" means that a fire alarm system is only required where Section 904.2 would require it for new construction.

EB49-13

Final Action: AS AM AMPC____ D

EB52-13

202, 1001.1, 1001.2, 1001.2.1, 1001.3, 1001.3.1

Proposed Change as Submitted

Proponent: Gerald Anderson, City of Overland Park, Kansas representing self (jerry.anderson@opkansas.org)

Revise as follows:

SECTION 202
GENERAL DEFINITIONS

CHANGE OF OCCUPANCY. A change in the ~~purpose or level of activity within a building that involves a change in application of the requirements of this code~~ use of the building or a portion a building. A change of occupancy shall include any change of occupancy classification, any change from one group to another group within an occupancy classification or any change in an allowable use within a given group for a specific occupancy classification.

Revise as follows:

1001.1 Scope. The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202, ~~including:~~

1. ~~Where the occupancy classification is not changed; or~~
2. ~~Where there is a change in occupancy classification of the occupancy group designations changes~~

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

1001.2.1 ~~Repair and alteration~~ Change in Occupancy with no change of occupancy classification. Any ~~repair or alteration~~ work undertaken in connection with a change ~~of occupancy~~ in use that does not involve a *change of occupancy* classification or a change to another group within a given occupancy classification shall conform to the applicable requirements for the work as classified in Chapter 4 and to the requirements of Section 1002 through 1011.

Exception: As modified in Section 1205 for *historic buildings*.

~~1001.3~~ 1001.2.2 Change of occupancy classification. Where the occupancy classification of a building changes, the provisions of Sections 1002 through 1012 shall apply. This includes a *change of occupancy* classification within a group as well as a *change of occupancy* classification from one group to a different group.

~~1001.3.1~~ 1001.2.2.1 Partial change of occupancy classification. Where a portion of an *existing building* is changed to a new occupancy classification, Section 1012 shall apply.

Reason: The purpose of the code change is to bring the IEBC definition for a change in occupancy more in line with the IBC definition for a change in occupancy. The additional portions of the code change clarify the intent of the code.

Definition: The definition for a change in occupancy should include all things that would constitute a change in occupancy. The IBC uses the words "use, groups and occupancy classification. For consistency and clarity it is important to stick with language used in the building code thus I changed out the word purpose with use. Example: Occupancy classifications are A,B,H,R,I,M,S &

U. The different occupancy classifications can be divided into Groups, i.e. A-1, A-2, A-3 etc. and within the various groups there are examples of allowed uses for a particular group. Such as under group A-3, we find are art galleries, dance halls, & bowling alleys.

Some other reasons for changing the definition: The words "level of activity" is vague. It would also appear that a change in occupancy is somehow dependent on whether there are other code requirements for the new occupancy. A change in occupancy should be a yes or no question. If the answer is yes then one proceeds to determine what new code provisions are applicable if any.

Section 1001.1 Scope. The stricken language is no longer necessary because the bullets points have been included in the definition. With the proposed language, I am trying to make a simple statement that the use of a building cannot be changed without the approval of the code official.

Section 1001.2. The current language is vague. It appears that the existing language is trying to address a change in use. I have inserted the word use in order to make it clear as to what the code is trying to address. It is not necessary to speak to the special provisions of the applicable International codes whatever they are. A change in use is not dependent on special provisions of the code.

Section 1001.2.1. The current language is confusing and is in conflict with 1001.3. With the new wording, I am clarify that when there is a change of use that does not involve a change in occupancy classification or a change from one group to another in a given occupancy classification the code then refers one back to chapter 4 and sections 1002 through 1011. . It is not necessary to talk about "repair and alteration" for that is not the subject. The subject matter is change in occupancy which has resulted from a change in use.

I have renumbered the existing sections 1001.3 and 1001.3.1 making them subsections of 1001.2. All of the sections are addressing different types of occupancy change so it seems more appropriate to have one section with various subsections.

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

1001.1-EB-ANDERSON.doc

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: This proposal was approved to be consistent with the Chapter 4 of the IEBC (Previously Chapter 34 of the IBC) regarding change of occupancy.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CHANGE OF OCCUPANCY. A change in the use of the building or a portion of a building. A change of occupancy shall include any change of occupancy classification, any change from one group to another group within an occupancy classification or any change in ~~an allowable~~ use within a ~~given~~ group for a specific occupancy classification.

1001.1 Scope. The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202.

1001.2 Certificate of ~~Change in~~ occupancy. A change ~~in use~~ of occupancy shall not be made to any structure without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change ~~in~~ of occupancy have been met.

1001.2.1 Change of use ~~in~~ **~~occupancy with no change of occupancy classification~~**. Any work undertaken in connection with a change in use that does not involve a *change of occupancy* classification or a change to another group within an ~~given~~ occupancy classification shall conform to the applicable requirements for the work as classified in Chapter ~~4~~ 5 and to the requirements of Section 1002 through 1011.

Exception: As modified in Section 1205 for *historic buildings*.

1001.2.2 Change of occupancy classification or group. Where the occupancy classification or group of a building changes, the provisions of Sections 1002 through 1012 shall apply. This includes a *change of occupancy* classification; ~~within a group as well as~~ and a *change* ~~*of occupancy*~~ ~~classification from one group to a different group.~~ to another group within an occupancy classification.

1001.2.2.1 Partial change of occupancy ~~classification~~. Where <u>the occupancy classification or group of</u> a portion of an *existing building* is changed ~~to a new occupancy classification~~, Section 1012 shall apply.

Commenter's Reason: This proposal does a very good job of clarifying the rules for change of occupancy. It's always been a confusing subject but this proposal lays out a logical way of organizing changes of occupancy into 3 categories. The definition sets up a hierarchy as explained in the reason for the original proposal. The hierarchy is:

- Classification (A, B, E, etc.)
  - Group (numbered subset within some classifications A-1, F-2, etc.)
    - Use (B animal hospital vs. B post office)

As stated in the original definition, change of occupancy "…shall include any change of occupancy classification [e.g. B to R], any change from one group to another group within an occupancy classification [e.g. R-1 to R-2] or any change in an allowable use within a given group [e.g. R-2 dormitory to R-2 boarding house]." The text in brackets was added.

This comment makes the original proposal a little clearer and straightens out some inconsistencies within the section.

- In the definition "allowable" is deleted because the rules for change of occupancy should apply even if the original use was not allowed.
- Section titles are changed to better reflect the subject of the sections.
- "Change in occupancy" is changed to "change of occupancy" for consistency.
- In 1001.2 "change in use" is changed to "chance of occupancy" because the section should apply to changes of occupancy, not only to change of use.
- 1001.2.2 corrects on instance where the original proposal misused the terms, and simplifies the language. The modification uses language similar to 1001.2.1.
- Section 1001.2.2.1 is modified so that Section 1012 applies to partial change of occupancy in the same way as it applies when an entire building changes.

EB52-13

Final Action: AS AM AMPC____ D

EB53-13
1001.1, 1001.2, 1004.1, 1012.1, 1012.1.1.1, 1012.1.1.2, 1012.2.1, 1012.2.2

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com)

Revise as follows:

1001.1 Scope. The provisions of this chapter shall apply where a change of occupancy occurs, as defined in Section 202, including:

1. Where the occupancy classification is not changed; ~~or~~
2. Where there is a change in occupancy classification or the occupancy group designation changes~~.~~ ; or
3. Where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code*.

1001.2 Change in occupancy with no change of occupancy classification. A change in occupancy, as defined in Section 202, with no *change of occupancy* classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, including the provisions of Sections 1002 through 1011, without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change in occupancy have been met.

1004.1 General. Fire protection requirements of Section 1012 shall apply where a building or portions thereof undergo a *change of occupancy* classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code*.

1012.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occupancy classification from one group to a different group or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code*. Such buildings shall also comply with Sections 1002 through 1011. The application of requirements for the change of occupancy shall be as set forth in Sections 1012.1.1 through 1012.1.4. A *change of occupancy*, as defined in Section 202, without a corresponding change of occupancy classification shall comply with Section 1001.2.

1012.1.1 Compliance with Chapter 9. The requirements of Chapter 9 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 1012.1.1.1 and 1012.1.1.2.

1012.1.1.1 Change of occupancy classification without separation. Where a portion of an *existing building* is changed to a new occupancy classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* and that portion is not separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, the entire building shall comply with all of the requirements of Chapter 9 applied throughout the building for the most restrictive occupancy classification in the building and with the requirements of this chapter.

1012.1.1.2 Change of occupancy classification with separation. Where a portion of an *existing building* that is changed to a new occupancy classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* and that portion is separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, that portion shall comply with all of the requirements of Chapter 9 for the new occupancy classification and with the requirements of this chapter.

1012.2 Fire protection systems. Fire protection systems shall be provided in accordance with Sections 1012.2.1 and 1012.2.2.

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs.

1012.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* that requires a fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the *change of occupancy* occurs and shall be automatically activated.

Reason: This proposed change is a result of the NIST analysis and report on the Charleston Sofa Store Fire. Recommendation 4 of the NIST report reads as follows:

"NIST recommends that model codes require sprinkler systems and that state and local authorities adopt and aggressively enforce this provision:

a) for all new commercial retail furniture stores regardless of size; and
b) for existing retail furniture stores with any single display area of greater than 190 m^2 (2000 ft^2).

An installed fire sprinkler system that complied with a national standard such as NFPA 13 [3] would have activated and would have controlled the fire growth. If the showrooms had been divided into smaller areas with fire barriers, the compartmentation would have slowed the spread of the fire as well."

Upon investigation of recommendation 4 of the NIST report, a review of where in the family of I codes to put requirements for upgrading to automatic sprinkler protection for occupancies manufacturing, storing or merchandizing upholstered furniture and mattresses occurred. During this review it was noted that the International Existing Building Code applies the concept of "change of occupancy" broadly and not only to capture a change in the Group, but a change in the occupancy classification with a change in the Group, (see the classification breakdowns under each Group in Chapter 3 of the International Building Code).

The definition for Change of Occupancy drills down to a change "in the purpose of level of activity" for applying more current requirements of the IEBC and the IBC.

CHANGE OF OCCUPANCY. A change in the purpose or level of activity within a building that involves a change in application of the requirements of this code.

SECTION 1001
GENERAL

1001.1 Scope. The provisions of this chapter shall apply where a change of occupancy occurs, as defined in Section 202, including:

1. Where the occupancy classification is not changed; or
2. Where there is a change in occupancy classification or the occupancy group designation changes.

SECTION 1012
CHANGE OF OCCUPANCY CLASSIFICATION

1012.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occupancy classification from one group to a different group.

What I noted was that when applying principals of fire protection, Chapter 9 of the International Building Code has use and levels of activity breakdowns separate and, in some cases, distinct from the occupancy classifications found in Chapter 3 of the International Building Code. In many cases these breakdowns are more significant than those found in Chapter 3 of the International Building Code.

What this proposal does is to suggest the insertion of language into Chapter 10 of the International Existing Building Code that would provide for capturing the fire protection thresholds found in Chapter 9 of the International Building Code as additional, and in many cases more accurate, triggers for the installation of fire protection systems and devices when a change of use or occupancy occurs within an existing building.

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

1001.1-EB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There was concern that this proposal was excessive. In addition it was unclear what occurs when a change of occupancy has a "fire protection threshold requirement in Chapter 9 of the IBC." In other words what is required to occur. More language to clarify how chapter 9 of the IBC would apply is necessary. Generally the proposal would increase the scope of what would need to comply with the IBC when a change of occupancy or change of occupancy classification occurs.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert J. Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1001.1 Scope. The provisions of this chapter shall apply where a change of occupancy occurs, as defined in Section 202, including:

1. Where the occupancy classification is not changed; or
2. Where there is a change in occupancy classification or the occupancy group designation changes. ; or
3. Where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code*.

1001.2 Change in occupancy with no change of occupancy classification. A change in occupancy, as defined in Section 202, with no *change of occupancy* classification or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code* shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, including the provisions of Sections 1002 through 1011, without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change in occupancy have been met.

1004.1 General. Fire protection requirements of Section 1012 shall apply where a building or portions thereof undergo a *change of occupancy* classification or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code*.

1012.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occupancy classification from one group to a different group or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code*. Such buildings shall also comply with Sections 1002 through 1011. The application of requirements for the change of occupancy shall be as set forth in Sections 1012.1.1 through 1012.1.4. A *change of occupancy*, as defined in Section 202, without a corresponding change of occupancy classification shall comply with Section 1001.2.

1012.1.1 Compliance with Chapter 9. The requirements of Chapter 9 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 1012.1.1.1 and 1012.1.1.2.

1012.1.1.1 Change of occupancy classification without separation. Where a portion of an *existing building* is changed to a new occupancy classification or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code* and that portion is not separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, the entire building shall comply with all of the requirements of Chapter 9 applied throughout the building for the most restrictive occupancy classification in the building and with the requirements of this chapter.

1012.1.1.2 Change of occupancy classification with separation. Where a portion of an *existing building* that is changed to a new occupancy classification or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code* and that portion is separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, that portion shall comply with all of the requirements of Chapter 9 for the new occupancy classification and with the requirements of this chapter.

1012.2 Fire protection systems. Fire protection systems shall be provided in accordance with Sections 1012.2.1 and 1012.2.2.

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code* that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs.

1012.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs or where there is a change in use or occupancy ~~with~~ within a space where there is a different ~~a~~ fire protection system threshold requirement in Chapter 9 of the *International Building Code* that requires a fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the *change of occupancy* occurs and shall be automatically activated.

Commenter's Reason: In response to committee concerns the language has been clarified to address use changes within a space and to clarify that the trigger is a different threshold for the installation of a fire protection system. The language addresses the trigger, the base requirements for what actions to take remain unchanged in the existing IEBC language.

Below are two examples where the fire protection threshold triggers would be different then the simple listing of different activities found in Chapter 3 which is covered by the current language. In the case of an F-1, a woodworking operation in an existing space may change by increasing the area it is operated in and because the use of the space or occupancy classification did not change, the need for the added fire protection would not be triggered. By adding the new language to the IEBC as suggested, these thresholds will get captured.

[F] 903.2.4 Group F-1.

An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. *A Group F-1 fire area exceeds 12,000 square feet (1115 m2).*
2. *A Group F-1 fire area is located more than three stories above grade plane.*
3. *The combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m2).*
4. *A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m2).*

[F] 903.2.4.1 Woodworking operations.

An automatic sprinkler system shall be provided throughout all Group F-1 occupancy fire areas that contain woodworking operations in excess of 2,500 square feet (232 m2) in area which generate finely divided combustible waste or use finely divided combustible materials.

A similar example would a be a S-1 Group automobile repair garage where the only occupancy classification listing is:

"Motor vehicle repair garages complying with the maximum allowable quantities of hazardous materials listed in Table 307.1(1) (see Section 406.8)"

If the activity introduces commercial vehicle repair which has a lower square footage threshold than passenger automobile repair, the existing IEBC language will not capture the need for the improved fire protection. The suggested new language will.

[F] 903.2.9 Group S-1.

An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. *A Group S-1 fire area exceeds 12,000 square feet (1115 m2).*
2. *A Group S-1 fire area is located more than three stories above grade plane.*
3. *The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m2).*
4. *A Group S-1 fire area used for the storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m2).*
5. *A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m2).*

[F] 903.2.9.1 Repair garages.

An automatic sprinkler system shall be provided throughout all buildings used as repair garages in accordance with Section 406, as shown:

1. Buildings having two or more stories above grade plane, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m2).
2. Buildings no more than one story above grade plane, with a fire area containing a repair garage exceeding 12,000 square feet (1115 m2).
3. Buildings with repair garages servicing vehicles parked in basements.
4. A Group S-1 fire area used for the repair of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m2).

[F] 903.2.9.2 Bulk storage of tires.

Buildings and structures where the area for the storage of tires exceeds 20,000 cubic feet (566 m3) shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

Overall, this is not a major increase in requirements, the majority of the IBC/IFC Chapter 9 thresholds would be captured with occupancy classification changes. This suggested language plugs a small hole in the application of fire protection requirements.

EB53-13
Final Action: AS AM AMPC____ D

EB57-13
1012.2.1.1 (NEW)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Add new text as follows:

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the International Building Code, such system shall be provided throughout the area where the change of occupancy occurs.

1012.2.1.1 Fire sprinkler system Group A occupancy. Where the new occupancy classification requiring an automatic sprinkler system is Group A-1, A-2, A-3 or A-4, an automatic sprinkler system shall be provided throughout the area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and throughout all floors from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy.

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

In almost all cases where Chapter 9 of the IBC specifies the need for a fire suppression system it is due to the inherent fire hazard of the use itself, thus justifying the protection only within the changed area. The exception to that rule is in the Assembly Groups. The trigger for the Assembly Groups A-1, A-2, A-3 and A-4 is the occupant load and it is clear from the expanded requirements found in IBC Section 903.2.1, the protection is to also include the intervening spaces and floors so their egress path is not compromised by a fire located in those areas. We feel that the IEBC should also reflect that intent by adding this new subsection.

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

1012.2.1.1 (NEW)-EB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was approved as Group A occupancies can have a potential of many occupants who are typically unfamiliar with the building. This clarifies that the sprinklers be located not only within the Group A occupancy but also protect all portions of the building below to the nearest level of exit discharge to protect occupants during evacuation. This proposal is consistent with the IBC. This addresses situations such as a Group A occupancy being added to a roof.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Orlowski, National Association of Home Builders (NAHB) and Tim Ryan, International Association of Building Officials (IABO), request Disapproval.

Commenter's Reason: We disagree with the committee's action to now require the installation of a suppression system in all areas and levels between the new assembly occupancy and the level of discharge in existing buildings. The existing building code has always taken into consideration that there are a large number of existing buildings that do not meet the current building code requirements and that to bring these buildings into compliance would be cost prohibitive and would ultimately leave many of these buildings that could be rehabilitated to be left unused, vacant and become unusable and not properly maintained. For existing buildings that are occupied, to require all levels between the new assembly and the level of discharge to be equipped with a fire suppression system, not only would be a huge financial burden on the building owner, it would require displacing tenants and business from areas that would be unaffected by a change in occupancy somewhere in the building that is outside the work area. Under the current requirements of the IEBC, the assembly is already required to be sprinklered and the means of egress must be separate from the remainder of the building, which provides protection for the occupants evacuating the structure without compromising the minimum standard for life safety and fire prevention in existing buildings.

EB57-13

Final Action: AS AM AMPC____ D

EB59-13
1012.5.1

Proposed Change as Submitted

Proponent: Gene Boecker, Code Consultants, Inc., representing self

Revise as follows:

1012.5.1 Height and area for change to higher hazard category. When a change of occupancy classification is made to a higher hazard category as shown in Table 1012.5, heights and areas of buildings and structures shall comply with the requirements of Chapter 5 of the *International Building Code* for the new occupancy classification.

Exceptions:

1. In other than Groups H, F-1 and S-1, in lieu of fire walls, use of fire barriers having a fire-resistance rating of not less than that specified in Table 706.4 of the *International Building Code*, constructed in accordance with Section 707 of the *International Building Code*, shall be permitted to meet area limitations required for the new occupancy in buildings protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.
2. Regardless of height, for high-rise buildings, the type of construction reduction specified in Section 403.2.1 of the *International Building Code* is permitted. This shall include the reduction for columns. The high rise building is required to be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*.

Reason: When the International Building Code changed to disallow the reduction of ratings on columns for high-rise buildings, it created a problem for existing buildings which had previously used the allowed reduction. This provision in the IEBC does not recognize those previously complying buildings. To meet the requirements as currently written, any change in occupancy from an office to a retail area would require a complete upgrade in the fire-resistance rating for all the columns in the entire building. This is excessive for small changes in occupancy and often impractical.

The revised language makes it clear that if the building is protected throughout with an automatic fire sprinkler system, designed to meet NFPA 13 (not 13R), then the column ratings can be what was allowed prior to the code change to the IBC. Additions will need to meet the requirements for new construction, but a change in occupancy of this type should not require the entire building to fall into non-compliance when it was fully compliant when it was built as little as five years ago.

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

1012.5.1-EB-BOECKER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was felt to be a reasonable approach that would not require high rise buildings to upgrade their construction type due to more restrictive requirements in Section 403. These restrictions have only been in the IBC in more recent code editions. A building could only use this exception where it is equipped throughout with an automatic sprinkler system.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jonathan Siu, City of Seattle Department of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1012.5.1 Height and area for change to higher hazard category. When a change of occupancy classification is made to a higher hazard category as shown in Table 1012.5, heights and areas of buildings and structures shall comply with the requirements of Chapter 5 of the *International Building Code* for the new occupancy classification.

Exceptions:

1. In other than Groups H, F-1 and S-1, in lieu of fire walls, use of fire barriers having a fire-resistance rating of not less than that specified in Table 706.4 of the *International Building Code*, constructed in accordance with Section 707 of the *International Building Code*, shall be permitted to meet area limitations required for the new occupancy in buildings protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.

2. ~~Regardless of height, for~~ For high-rise buildings constructed in compliance with a previously-issued permit, the type of construction reduction specified in Section 403.2.1 of the *International Building Code* is permitted. This shall include the reduction for columns. The high rise building is required to be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*.

Commenter's Reason: While we agree with the intent of the code change, there are two issues in this proposed code change that when considered in conjunction with each other may lead to unintended consequences for new high rise buildings, unless addressed as we have proposed in this Public Comment. The first issue is related to the phrase, "Regardless of height," which appears to be intended to address the "super high-rise" buildings greater than 420 feet in height. The second issue is related to the definition of "existing building" in the IEBC.

For new construction, the IBC limits the reduction of type of construction to buildings not greater than 420 feet in height (IBC Section 403.2.1.1, Item 1). In his reason statement, the proponent discusses the problem created "for existing buildings which had previously used the allowed reduction." It is clear he is addressing buildings which have already been constructed, and we agree with that perspective—it would be impractical to add fireproofing in an existing super high-rise building. The difficulty with the proposal arises due to the definition of "existing building" in the IEBC:

"EXISTING BUILDING. A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued." [emphasis added]

With this definition, a designer can get a permit issued to build a new super high-rise building, then come back later and apply for a change of occupancy and reduce the fire protection, without having actually built the building. This is not an entirely hypothetical situation. In Seattle, we issued building permits for a 600-plus foot tall office building several years ago. In the recent economic downturn, the owner mothballed the project. Within the last year, the owner applied for revisions to the original permit, to change the upper portion of the building to hotel. This would clearly be a change of occupancy classification to a higher hazard category in IEBC Table 1012.5 (Relative Hazard category 4 for B occupancies, 2 for R-1 occupancies). Yet, even though no construction has started, if the proposed change were in place, the architect could reduce the fire protection on the columns.

We believe the focus, as implied in the reason statement, ought to be on buildings that have already been constructed and were in compliance with a previous edition of the code, but are now non-conforming because the current code is different. To keep this focus, we have proposed to:

1. Delete the phrase "regardless of height." This phrase is unnecessary, as what remains will apply to all high-rise buildings.
2. Limit the application of the proposed exception to buildings that have been actually been built in accordance with a previous building permit, and therefore, presumably constructed in compliance with the applicable codes in effect at the time of construction.

We believe these changes will keep the focus on existing non-conforming buildings, and address the issue of the combination of the super high-rise provisions and the IEBC definition as discussed above.

As a note, this proposed code change would not change how projects that include changes to existing fire-resistance protection are regulated, since those projects would be subject to the provisions in the IEBC dealing with alterations.

EB59-13

Final Action: AS AM AMPC____ D

EB63-13
602.1.1 (New), 702.1.1 (New), 1202.2.1 (New), Chapter 16

Proposed Change as Submitted

Proponent: Rebecca Morley, National Center for Healthy Housing

Add new text as follows:

SECTION 602
BUILDING ELEMENTS AND MATERIALS

602.1 Existing building materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to render the building or structure unsafe or *dangerous* as defined in Chapter 2.

602.1.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION 702
BUILDING ELEMENTS AND MATERIALS

702.1 Interior finishes. All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

702.1.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where alterations disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION 1202
REPAIRS

1202.1 General. Repairs to any portion of an *historic building* or structure shall be permitted with original or like materials and original methods of construction, subject to the provisions of this chapter. Hazardous materials, such as asbestos and lead-based paint, shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

1202.2.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Add the following standard to Chapter 16:

EPA U.S. Environmental Protection Agency

40 CFR 745 - July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code's requirements. These requirements are already law in every state through the Environmental Protection Agency's Renovation Repair and Painting Rule, which governs work with paint that may contain lead-based paint in order to prevent childhood lead poisoning. These regulations have been in effect since April 2010, and have been adopted by 12 states.

Renovation of painted surfaces is a significant sources of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.[1,2,5,8,9] Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood (µg/dL) is greatest at lead levels below 10 µg/dL. As a child's BLL increases from 1 to 10 µg/dL, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 µg/dL the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.[10]

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an "extremely low" IQ by 57%, substantially increasing the cost of special education programs.[3] Considering the costs to the special education system alone, one study conservatively estimated that it costs $38,000 over three years to educate a child with lead poisoning.[11] Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes. EBLLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.[1,4] Each 1 µg/dL reduction in the average preschool blood lead level saves $13.4 billion from the direct and indirect costs of crime.[1]

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,[12] the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 µg/dL. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 µg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 µg/dL.[6]

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk.

The additions to Sections 602, 702, and 1202 add health-protective requirements to protect children from lead poisoning by preventing the dispersal of lead before, during, and after work performed on a pre-1978 home. The information distribution, certification, and lead safe practices requirements are already in effect in federal and state regulation.

This change would only affect structures likely to contain lead-based paint: pre-1978 homes. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead's presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

The EPA 40 CFR 745 standard is available at http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml.

References

1. Gould E. Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. Environ. Health Perspect. 2009;117(7):1162–1167.
2. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations. Environ. Health Perspect. 2008;116(2):243–248.
3. Mazumdar M, Bellinger DC, Gregas M, Abanilla K, Bacic J, Needleman HL. Low-level environmental lead exposure in childhood and adult intellectual function: a follow-up study. Environ Health. 2011;10:24.
4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. Arch. Dis. Child. 2009;94(11):844–848.
5. Miranda ML, Kim D, Galeano MA, Paul CJ, Hull AP, Morgan SP. The relationship between early childhood blood lead levels and performance on end-of-grade tests. Environ. Health Perspect. 2007;115(8):1242–1247.
6. Miranda ML, Maxson P, Kim D. Early childhood lead exposure and exceptionality designations for students. Int J Child Health Hum Dev. 2010;3(1):77–84.
7. Advisory Committee on Childhood Lead Poisoning Prevention. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. 2012:1–68. Available at: http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf. Accessed March 6, 2012.
8. Lanphear BP, Hornung R, Khoury J, et al. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. Environ. Health Perspect. 2005;113(7):894–899.
9. Canfield RL, Henderson CRJ, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. N. Engl. J. Med. 2003;348(16):1517–1526.16.
10. Lanphear BP, Dietrich K, Auinger P, Cox C. Cognitive deficits associated with blood lead concentrations. Public Health Rep. 2000;115(6):521–529.17.
11. Korfmacher KS. Long-term costs of lead poisoning: How much can New York save by stopping lead? Rochester, NY: University of Rochester; 2003.
12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. N Engl J Med. 1982; 306(6):367.

Cost Impact: This code change proposal will not increase the cost of additions, alterations or repairs since these federal/state requirements are already in effect.

Staff analysis: A review of the standard proposed for inclusion in the code, 40 CFR 745 -July 1, 2012 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

1510.1 (NEW)-EB-MORLEY.doc

Committee Action Hearing Results

For staff analysis of the content of EPA 40 CFR 745-July 1, 2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved based upon the previous action taken on ADM37-13 by the IEBC Committee.

Assembly Action **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 602
BUILDING ELEMENTS AND MATERIALS

602.1 Existing building materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to render the building or structure unsafe or *dangerous* as defined in Chapter 2.

602.1.1 Disturbance of existing painted surfaces. In any Group E day care, Group I-4 child day care, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall ~~comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.~~ leave behind no visible dust, debris or residue .

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) ~~(1) or (2) that proves~~ that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION 702
BUILDING ELEMENTS AND MATERIALS

702.1 Interior finishes. All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

702.1.1 Disturbance of existing painted surfaces. In any Group E day care, Group I-4 child day care, R-2, R-3, R-4 occupancies completed prior to 1978, where alterations disturb painted surfaces, the work shall ~~comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.~~ leave behind no visible dust, debris or residue .

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) ~~(1) or (2) that proves~~ that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION 1202
REPAIRS

1202.1 General. Repairs to any portion of an *historic building* or structure shall be permitted with original or like materials and original methods of construction, subject to the provisions of this chapter. Hazardous materials, such as asbestos and lead-based paint, shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

1202.2.1 Disturbance of existing painted surfaces. In any <u>Group E day care, Group </u>I-4<u> child day care, </u>R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall ~~comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations~~<u> leave behind no visible dust, debris or residue .</u>

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)~~ (1) or (2) that proves~~ that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Add the following standard to Chapter 16:

EPA U.S. Environmental Protection Agency

40 CFR 745 - July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Commenter's Reason: Based on the Committee decision, we have reduced this code change from a requirement for full compliance with the federal regulation to the essential but simple performance standard that will protect the occupant's and worker's children from exposure to harmful lead. It is consistent with the federal regulation in that clean-up is required at the end of renovation work. This requirement can be enforced by the code official with a visual inspection: no testing or special information is needed.

We have also clarified the Group I and E occupancies.

The exemption applies if the project meets one of these standards at 40 CFR 745.82(a):
(1) a written determination has been made by a certified inspector or risk assessor that the components affected by the renovation are free of paint or other surface coatings that contain lead;
(2) a certified renovator, using an EPA recognized test kit, has tested each component affected by the renovation and determined that the components are free of paint or other surface coatings that contain lead;
(3) a certified renovator has collected a paint chip sample from each painted component affected by the renovation and a laboratory recognized by EPA has determined that the samples are free of paint or other surface coatings that contain lead.

EB63-13

Final Action: AS AM AMPC____ D

F6-13
202 (IBC [F] 202)

Proposed Change as Submitted

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

Revise as follows:

SECTION 202 (IBC [F] 202)
GENERAL DEFINITIONS

FLAMMABLE SOLID. A solid, other than a blasting agent or *explosive*, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16 CFR Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than ~~0.1~~ 0.0866 inch (~~2.5 mm~~ 2.2 mm) per second along its major axis.

Reason: The definition proposed is in line with GHS [Globally Harmonized System] which is now adopted by OSHA. When an MSDS is prepared today, a material classified as “Flammable Solids” is typically based on this definition and not the previous definition [existing language in the Fire Code]. For additional details please see http://www.osha.gov/dsg/hazcom/ghs.html.

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

202-FLAMMABLE SOLID-F-KLAUSBRUCKNER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee’s judgment that the code change could be the beginning of a trend toward acceptance of OSHA definitions which are much different than IFC definitions and are focused on worker and work-place safety only.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Elley Klausbruckner, representing Klausbruckner & Associates Inc., requests Approval as Submitted.

Commenter’s Reason: The issue that this code change is attempting to resolve has nothing to do with trends but is a practical one. Chemicals are classified by using data in the Materials Safety Data Sheet [MSDS]. Unlike flammable/combustible liquids, where locations are provided data entry of flashpoint and boiling point, data on combustibility of a dust, as well as method of testing, is typically not found on an MSDS. The MSDS will simply indicate “Combustible Dust” in the MSDS. The MSDS typically follows the definitions of OSHA as well as GHS. Therefore the person classifying the material [whether it be an AHJ or an industry] cannot determine for certain whether the dust is combustible based on the definitions in the fire code. Whether an individual classifies a material as Combustible Dust or not, based on the statement in an MSDS, it will subject that person classifying the product to liability.

Given that the definitions between OSHA and the Fire Code are close [self-sustained flame at a rate greater than 0.1 <u>0.0866</u> inch (2.5 mm <u>2.2 mm</u>) per second] this would be a minor adjustment in definitions.

F6-13

Final Action: AS AM AMPC____ D

F13-13
308.1.6.3 (New), 202 (New)

Proposed Change as Submitted

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

Add new text as follows:

308.1.6.3 Sky lanterns. No person shall release or cause to be released an untethered sky lantern.

Add new definition as follows:

SECTION 202
GENERAL DEFINITIONS

SKY LANTERN. An unmanned device with a combustible fuel source that incorporates an open flame in order to make the device airborne.

Reason: Sky lanterns contain an open flame used to heat the air inside the device to make it airborne. Once airborne, these devices are subject to winds and other atmospheric conditions so that the location of the landfall is completely unknown and uncontrolled by the user. Obviously, uncontrolled open flame devices descending out of the sky have the significant potential to start wildfires and structural fires.

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

308.1.6.3 (NEW)-F-APFELBECK

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

SKY LANTERN. An unmanned device with a ~~combustible~~ fuel source that incorporates an open flame in order to make the device airborne.

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee approved the code change based on the proponent's reason statement that untethered flaming sky effects pose an uncontrollable ignition hazard. The modification recognizes that the fuel package may not be limited to combustible fuel but could include flammable fuels as well.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

SKY LANTERN. An unmanned device ~~with a fuel source~~ that incorporates an open flame in order to make the device airborne.

(Portions of the proposal not shown remain unchanged.)

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

It is not necessary to describe that sky lanterns have a fuel source; the open flame describes the device, and the hazard, appropriately without reference to a fuel source.

F13-13

Final Action: AS AM AMPC____ D

F16-13
315.3.2

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Revise as follows:

315.3.2 Means of egress. Combustible materials shall not be stored in exits, <u>corridors</u> or enclosures for stairways and ramps.

Reason: The code presently does not address storage of combustible materials in exit access corridors. The code prohibits storage in the exit, but says nothing about the corridor. This will provide the inspector with a tool to regulate the storage of combustible materials in a corridor.

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

315.3.2-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the provisions of current Section 1020 adequately cover the issue. It was also unclear as to what "storage" could be interpreted to be, such as one piece of furniture, or a single file cabinet. It was also noted that corridors are not required by the code and are not subject to the same stringent requirements as an exit would be.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

315.3.2 Means of egress. Combustible materials shall not be stored in exits<u>,</u> ~~corridors or~~ enclosures for stairways<u>, enclosures for</u> ~~and~~ ramps<u>, or any exit access for 10 or more occupants</u>.

Commenter's Reason: Disapproval of this item will allow a significant hole to remain in the IFC that is a direct contributor to past multiple-fatality fires. The committee statement, which indicates that Section 1020 adequately addresses this issue, is incorrect. Section 1020 only deals with exits, not exit access, which is a different part of the 3-part means of egress used by the IFC and IBC. The focus of this proposal is storage in an exit access (not an exit), which currently has no storage limitations.

The committee statement also complained about a lack of clarity associated with the term "stored," but this term is already in the existing code text. It was the intent of the original proposal to simply continue use of the existing term, and this comment maintains that approach.

This issue originated as a result of rolled carpet, padding and adhesive being stored in the corridor of a hotel where ICC was holding committee meetings. The hotel was being remodeled. Fire code officials who were present at the meeting were concerned about the risk that this storage created, and we looked for a code section that could be cited to ask management to remove these materials from the exit access corridor. To our surprise, we couldn't come up with any clear requirement in the IFC to address the issue (although many of us were sure that there was one).

It is understood that the committee had some heartburn with the original proposal targeting “corridors,” because technically corridors aren’t required to be provided. So, this comment takes a different approach. The basis of applying this provision to exit accesses serving 10 or more occupants is an attempt to find a “reasonable” threshold for the requirement while avoiding a specific limitation to corridors. IFC Table 1015.1 was used as a guide. It establishes a threshold at or above which two or more exits or exit access doorways must be provided for most occupancies, indicating that an increased level of safety is warranted for the means of egress.

F16-13
Final Action: AS AM AMPC____ D

F17-13

315.3.5 (New), 903.3.1.1.1 (IBC [F] 903.3.1.1.1)

Proposed Change as Submitted

Proponent: Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

315.3.5 Rooms and areas exempted from automatic sprinkler system requirements. Storage shall not be permitted in any room or area where automatic sprinklers have been omitted in accordance with Section 903.3.1.1.1.

Revise as follows:

903.3.1.1.1 (IBC [F] 903.3.1.1.1) Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment. Storage shall not be permitted in any room or area omitting automatic sprinklers.

Reason: These exceptions in the IBC go beyond the requirements of NFPA 13 by inserting a heat detection system. Storage needs to be specifically addressed by this section as this exemption can be interpreted to allow storage in an unsprinklered room. Sprinkler systems adjacent to these rooms are not mandated to increase design criteria to accommodate this unsprinklered space. Fires in unsprinklered rooms with unknown or unpermitted storage could overcome the sprinkler system.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

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

315.3.5 (NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the code change would lead to inconsistent enforcement due to the use of the subjective term "storage" and since sprinklers could be omitted from "storage" rooms storing materials such as those that are incompatible with water [903.3.1.1.1(2)] or materials that are noncombustible [903.3.1.1.1(4)]. Such determinations should be left to the fire code official and the design professional.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Hugo, CBO, representing National Fire Sprinkler Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

315.3.5 Rooms and areas exempted from automatic sprinkler system requirements. Combustible storage shall not be permitted in any room or area where automatic sprinklers have been omitted in accordance with Section 903.3.1.1.1.

903.3.1.1.1 (IBC [F] 903.3.1.1.1) Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment. Combustible storage shall not be permitted in any room or area omitting automatic sprinklers.

Commenter's Reason: Combustible storage in a room where sprinklers are exempt (in a fully sprinklered building) could permit a fire to grow and not be contained to the room of origin thus jeopardizing the surrounding automatic sprinkler system.

The size of the rooms or areas exempt from sprinklers in Section 903.3.1.1.1 is not defined or limited. A building could be fully sprinklered, use all the automatic sprinkler system tradeoffs and have an unlimited exempt area with combustible storage. This section gives the designer and code official authority to have sprinklers exempted, and a direct prohibition on what else can be in that room or area.

F17-13

Final Action: AS AM AMPC____ D

F20-13
319 (New), 202 (New)

Proposed Change as Submitted

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

Add new text as follows:

SECTION 319
WILDLAND-URBAN INTERFACE AREAS

319.1 General. Buildings, structures or premises within wildland-urban interface areas shall comply with the *International Wildland-Urban Interface Code.*

SECTION 202
GENERAL DEFINITIONS

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

Reason: This code change:

1. Provides a definition for a "Wildland-Urban Interface Area" in the IFC Section 202 extracted from the definition in the IWUIC.
2. Provides a direct referral to the "Wildland-Urban Interface Code" in a new Section 319 within the IFC.

This code change will integrate the designation of a "Wildland-Urban Interface Area" and the reference International Wildland-Urban Interface Code as an integral part of the IFC. Rather than forcing a local jurisdiction to adopt the IWUIC separately, the IWUIC will be adopted as a reference when the IFC is adopted. The reason for this is two fold:

1. The base IFC should contain Wildland-Urban Interface requirements as an integral part of the document due to the expanding prevalence of these types of hazards that are confronted by the fire official. Users should not be forced to adopt a second document to be able to utilize the IWUIC and effectively address these types of conditions. Wildland-urban interface fire prevention is no different from the other base fire prevention requirements of the IFC and should be included as part of the model fire prevention code.
2. Adding the direct reference to the IWUIC into the IFC will not burden any jurisdiction with the requirement of the document unless there is an actual "Wildland-Urban Interface Area" within the jurisdiction. If there is a "Wildland-Urban Interface Area" within the jurisdiction, then the code should be specifying that the WUIA needs to be protected appropriately and set the standard of protection.

Cost Impact: This code change proposal will increase the cost of construction. Some WUIA that are not currently protected with a code, but should be protected, will end up with protection under this code change.

319 (NEW)-F-APFELBECK

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the applicability of the IWUIC would be better located in Chapter 1, Section 102 similar to the applicability statements for the IBC and the IRC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, (GBH International), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~SECTION 319~~
~~WILDLAND-URBAN INTERFACE AREAS~~

~~**319.1 General.** Buildings, structures or premises within wildland-urban interface areas shall comply with the *International Wildland-Urban Interface Code.*~~

102.6 Application of wildland-urban interface code. After a jurisdiction has designated an area as a wildland-urban interface area, the design and construction of new structures within that wildland-urban interface area shall comply with the International Wildland-Urban Interface Code and any *alterations*, additions, changes in use or changes in structures required by this code, which are within wildland-urban interface areas and are within the scope of the International Wildland-Urban Interface Code, shall be made in accordance therewith.

(Renumber following sections.)

SECTION 202
GENERAL DEFINITIONS

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

Commenter's Reason: The technical committee was not in opposition to the necessary link but just to the location. This comment places the link in the section recommended by the committee. Note that the language states that the application only starts **after** the jurisdiction has designated an area as a WUI area. In that way, areas that have not been designated as WUI areas by the jurisdiction will not be required to comply with the IWUIC code.

F20-13
Final Action: AS AM AMPC____ D

F23-13
403.3

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

403.3 Crowd managers. Trained crowd managers shall be provided for ~~facilities or~~ events where more than ~~1,000~~ 250 or more persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons. ~~Where *approved* by the *fire code official*, the ratio of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an *approved automatic sprinkler system* or based upon the nature of the event.~~

Exceptions:

1. Where approved, the number of crowd managers shall be permitted to be reduced by up to 50 percent where the fire and life safety protection provided and the nature of the event warrant a reduction.
2. Gatherings exclusively for religious worship with an occupant load not exceeding 1,000.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

The current code has no requirement for crowd managers until the occupant load in a public assembly reaches 1,000, then the code requires five trained crowd managers for an occupant load of 1001. This is illogical, especially since one of the events that generated this requirement, the Station Nightclub Fire, had an occupant load of less than 500. Smaller venues sometimes place the public at greater risk than large ones for many reasons, including the fact that larger facilities have greater requirements for other fire protection features. NFPA 1 and NFPA 101 require crowd managers in all public assemblies (except churches), so approving this code change will bring the two regulations closer to conformity.

The formatting change to place the potential reduction in the number of crowd managers in an exception is editorial; the exception was also changed to limit the reduction to half of the required number of crowd managers. Recent events have again emphasized that fire is not the only reason people will need to quickly exit a facility, so reducing the number strictly on the basis of a sprinkler system may be problematic. The exception for places of worship with occupant loads up to 1,000 recognizes the fact that people who are in these places of assembly normally have a greater awareness of their surroundings, and are more familiar with egress routes because they attend the church on a more regular basis than those at performances, who tend to be more transient.

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

403.3-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

403.3 Crowd managers. Trained crowd managers shall be provided for occupancies or events where more than 250 or more persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons.

Exceptions:

1. Where approved, the number of crowd managers shall be permitted to be reduced by up to 50 percent where the fire

and life safety protection provided and the nature of the event warrant a reduction.
2. Gatherings exclusively for religious worship with an occupant load not exceeding 1,000.

Committee Reason: The committee approved the code change based on the proponent's reason statement. The modification makes it clear that the provisions apply to both indoor and outdoor venues.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Dave Frable, representing U.S. General Services Administration, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

403.3 Crowd managers. Trained crowd managers shall be provided for assembly occupancies ~~or events~~ where more than 250 or more persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons.

Exceptions:

1. Where approved, the number of crowd managers shall be permitted to be reduced by up to 50 percent where the fire and life safety protection provided and the nature of the event warrant a reduction.
2. Gatherings exclusively for religious worship with an occupant load not exceeding 1,000.

Commenter's Reason: In the original reason statement the proponent states that the code change revisions were based on code text in NFPA 1 and NFPA 101 for assembly occupancies. The proponent further states that his intent was to have the requirements in the IFC and IBC consistent with the requirements in NFPA 1 and NFPA 101. However, the scope of the current code text appears to be much broader than the scope in NFPA 1 and NFPA 101 and now appears to be inconsistent with the requirements in NFPA 1 and NFPA 101. Therefore, we have revised the current code text to only require crowd managers for assembly occupancies and have deleted the text "or events" since this requirement would also apply to any event held outdoors where more than 250 person would congregate. For example, this would require outdoor wedding receptions as well as office picnics held in parks having more than 250 persons in attendance to require a crowd manager. We do not believe that the intent of the requirements for crowd managers that resulted from the Station Nightclub fire were to be applied to outdoor events such as those stated in the above examples. Last but not least, the fact that trying to enforce this requirement for all outdoor events of this size will be very difficult for the local code authority.

Public Comment 2:

Tim Ryan, representing The International Association of Building Officials, requests Disapproval.

Commenter's Reason: This proposal is overly restrictive in that such events as high school sporting events, large restaurants, wedding receptions, Bar Mitzvah's, etc., would be required to have a crowd manager. No data has been submitted that would indicate such events require trained crowd managers to increase the level of safety. The proponent identified one event, the Station Night Club fire, as the main supporting evidence for this requirement. It is questionable if the problems associated with the Station Night Club were the lack of codes or the lack of enforcement due to overcrowding.

F23-13
Final Action: AS AM AMPC____ D

F24-13
403.3.1

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

403.3.1 Training. Training for crowd managers shall be approved.

403.3.2 Duties. The duties of crowd managers shall include, but not be limited to:

1. Conduct an inspection of the area of responsibility and identify and address any egress barriers.
2. Conduct an inspection of the area of responsibility to identify and mitigate any fire hazards.
3. Verify compliance with all permit conditions, including those governing pyrotechnics and other special effects.
4. Direct and assist the event attendees in evacuation during an emergency.
5. Assist emergency response personnel where ~~if~~ requested.
6. Other duties required by the fire code official.
7. Other duties as specified in the fire safety plan

Reason: The Code requires "trained crowd managers", but doesn't provide any guidance or describe what that training should include. This has been an ongoing issue for enforcement personnel. This change is intended to address that void.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

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

403.3-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent that the code change provides needed specific guidance in the duties for crowd managers in support of the changes made in code change F23-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Ryan, representing The International Association of Building Officials, requests Disapproval.

Commenter's Reason: The proponent's reasoning statement indicated that this change was submitted to provide guidance for or describe what training should be included for crowd managers. The proposed change does not achieve the proponent's intent. The change only identifies duties but does not identify training or certification other than it has to be "approved" which is left to the enforcement official to decide. This creates inefficiencies between jurisdictions and is a very arbitrary requirement.

F24-13
Final Action: AS AM AMPC____ D

F30-13

404.3.2, Table 405.2, 408.5.1.1 (New), 408.5.1.2 (New), 408.5.3, 408.5.5, 408.5.6 (New), 408.10.1.1 (New), 408.10.5, 408.10.6 (New)

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

404.3.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance.
3. Site plans indicating the following:
   3.1. The occupancy assembly point.
   3.2. The locations of fire hydrants.
   3.3. The normal routes of fire department vehicle access.
4. Floor plans identifying the locations of the following:
   4.1. Exits.
   4.2. Primary evacuation routes.
   4.3. Secondary evacuation routes.
   4.4. Accessible egress routes.
   4.5. Areas of refuge.
   4.6 Refuge areas
   4.7 ~~4.6~~. Exterior areas for assisted rescue.
   4.8 ~~4.7~~. Manual fire alarm boxes.
   4.9 ~~4.8~~. Portable fire extinguishers.
   4.10 ~~4.9~~. Occupant-use hose stations.
   4.11 ~~4.10~~. Fire alarm annunciators and controls.
5. A list of major fire hazards associated with the normal use and occupancy of the premises, including maintenance and housekeeping procedures.
6. Identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires.
7. Identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel hazard sources.

TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B [c]	Annually	Employees
Group E	Monthly[a]	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift [a]	Employees[b]
Group R-1	Quarterly on each shift	Employees
Group R-2 [d]	Four annually	All occupants
Group R-4	Quarterly on each shift [a]	Employees[b]
High-rise buildings	Annually	Employees

a. The frequency shall be allowed to be modified in accordance with Sections 408.3.2, 408.5.6 and 408.10.6.
b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with

Section 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.

c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.

d. Applicable to Group R-2 college and university buildings in accordance with Section 408.3.

408.5.1.1 Fire evacuation plan. The fire evacuation plan required by Section 404 shall include a description of special staff actions. Plans shall include the following in addition to the requirements of Section 404.

1. In Group I-1 Condition 2 occupancies, procedures for evacuation through a refuge area in an adjacent smoke compartment and then to an exterior assembly point.

408.5.1.2 Fire safety plans. A copy of the plan shall be maintained at the facility at all times. Plans shall include the following in addition to the requirements of Section 404:

1. Location and number of any residents sleeping rooms.
2. Location of any special locking or egress control arrangements.

408.5.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. In Group I-1 Condition 2 occupancies training shall include evacuation through an adjacent smoke compartment and then to an exterior assembly point. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

408.5.5 Resident participation. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

408.5.6 Emergency evacuation drill deferral. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency specified in Section 405.2.

408.10.1.1 Fire safety plans. A copy of the plan shall be maintained at the facility at all times. Plans shall include the following in addition to the requirements of Section 404:

1. Location and number of any residents sleeping rooms.
2. Location of any special locking or egress control arrangements.

408.10.5 Resident participation. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

> **Exception:** Actual exiting from emergency escape and rescue windows shall not be required. Opening the emergency escape and rescue window and signaling for help shall be an acceptable alternative.

408.10.6 Emergency evacuation drill deferral. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency specified in Section 405.2.

Reason: The intent of this proposal is to clarify the requirements for Group I-1 and R-4 assembly points. It also clarifies the implementation of smoke compartments in the new Group I-1 Condition 2 as was approved for the 2015 IBC in the G 31-12. Finally it proposes severe climate flexibility for fire drill frequency.

The proposed change clarifies that Group I-1 Condition 2 “smoke compartment” refuge areas, as required in the G 31-12 Section 420, can be used as a temporary “refuge area” during evacuation prior to complete building evacuation..

The proposed code change allows for severe climate deferrals, similar to current Group E deferrals that are already allowed. This takes into consideration the possible danger to seniors inhabiting these occupancies, when they are required to go outside during fire drills when possible inclement weather is occurring. The proposal allows the fire code official to modify drill frequency. The provision is left as a general provision purposely due to the variations of severe climate throughout the country, whether it be hot or cold, winter or summer or from storms. It leaves up to local discretion, the opportunity to allow modifications. (This is reflected in the additional section references in Note a to Table 405.2.) The modifications in actual practice may also include still conducting the drill, while not requiring residents to actually go outside during the drill at certain times of the year. The residents would still be trained to go outside to the outdoor assembly point during a real emergency situation.

The assembly point aspects of the proposed change are more clerical. The revisions are proposed essentially from the current wording in Group E clarifying that an assembly point is outdoors coinciding with the building evacuation concepts of both Group I-1 and R-4 irrelevant of the "Condition."

These changes are stand alone but have been coordinated with the Ad Hoc committee proposed IFC changes for Group I-2 so as not to conflict with those proposed changes. These changes have also been coordinated with the separate CTC proposed IFC changes for the Table 405.2 for fire and safety evacuation drills for both Groups I-1 and R-4.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

404.3.2-F-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the code change based on the proponent's reason statement that it clarifies the text and provides the fire code official with flexibility in requiring drills during inclement weather.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee and Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

404.3.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance.
3. Site plans indicating the following:
   - 3.1. The occupancy assembly point.
   - 3.2. The locations of fire hydrants.
   - 3.3. The normal routes of fire department vehicle access.
4. Floor plans identifying the locations of the following:
   - 4.1. Exits.
   - 4.2. Primary evacuation routes.
   - 4.3. Secondary evacuation routes.
   - 4.4. Accessible egress routes.
     - 4.4.1 ~~4.5~~. Areas of refuge.
     - 4.4.2 ~~4.7~~. Exterior areas for assisted rescue.
   - 4.5 ~~4.6~~ Refuge areas associated with smoke barriers and horizontal exits
   - 4.6 ~~4.8~~. Manual fire alarm boxes.
   - 4.7 ~~4.9~~. Portable fire extinguishers.
   - 4.8 ~~4.10~~ Occupant-use hose stations.

4.9 ~~4.11~~. Fire alarm annunciators and controls.
5. A list of major fire hazards associated with the normal use and occupancy of the premises, including maintenance and housekeeping procedures.
6. Identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires.
7. Identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel hazard sources.

(Portions of proposal not shown remain unchanged.)

Reason: There was concern that the three terms, “areas of refuge”, “exterior area for assisted rescue” and “refuge area”, may be confused. However, all three are necessary information for the fire safety plan. The relocation will eliminate confusion and clarify the distinction between the elements that can be found in a building.

This proposal is co-sponsored by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

F30-13

Final Action: AS AM AMPC____ D

F39-13
503.2.2

Proposed Change as Submitted

Proponent: Carl D. Wren, P.E., Austin Fire Department, representing self (carl.wren@austintexas.gov)

Revise as follows:

503.2.2 Authority. The fire code official shall have the authority to require <u>or permit</u> an increase <u>or a decrease</u> in the minimum access widths where ~~they are inadequate for fire or rescue operations~~ <u>necessary to meet the public safety objectives of the jurisdiction.</u>

Reason: Fire departments respond to many types of emergency situations and the jurisdictions they serve may have traffic safety criteria that have an impact on the design of access roadways used by emergency response vehicles. It would also seem to be a wise course of action for the fire service and ICC to acknowledge and, when it is possible, to assist in developing methods of improving the safety of the public by helping to prevent injuries and deaths from hazards other than fire.

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

503.2.2 -F-WREN

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

503.2.2 Authority. The fire code official shall have the authority to require or permit ~~an increase or a decrease in the minimum~~ <u>modifications to the required</u> access widths where <u>they are inadequate for fire or rescue operations or where</u> necessary to meet the public safety objectives of the jurisdiction.

Committee Reason: The committee agreed with the proponent that the code change provides the fire code official with greater flexibility to accommodate variables and changes in hazard associated with fire apparatus access roads. The modification clarifies that the authorized modification may be to increase or to decrease the width.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved.

F42-13
503.4.1

Proposed Change as Submitted

Proponent: Carl D. Wren, P.E., Austin Fire Department, representing self (carl.wren@austintexas.gov)

Revise as follows:

503.4.1 Traffic calming devices. ~~Traffic calming devices shall be prohibited unless approved by the fire code official.~~ <u>The fire code official and the jurisdiction's traffic engineer shall work collaboratively to plan, design, and install traffic calming devices. Approved traffic calming devices shall be designed to provide for adequate emergency vehicle access in addition to mitigating unsafe traffic conditions identified by the traffic engineer.</u>

Reason: Fire departments respond to many types of emergency situations and the jurisdictions they serve may have traffic safety criteria that have an impact on the design of access roadways used by emergency response vehicles. The design of traffic calming features has been changing over the years as traffic engineers better understand measures that can change how people drive their vehicles. Since data available from the Centers for Disease Control indicate that annual traffic fatalities involving pedestrians likely exceed fire deaths in the United States (see http://www.edc.gov/motorvehiclesafety/pedestrian_safety/factsheet.html), it would also seem to be a wise course of action for the fire service and ICC to encourage collaboration with traffic engineers and, when it is possible, to assist in developing methods of improving the safety of the public by helping to prevent injuries and deaths from hazards other than fire.

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

503.4.1-F-WREN

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

503.4.1 Traffic calming devices. <u>Traffic calming devices in fire vehicle access routes shall only be permitted where necessary to mitigate unsafe traffic conditions that have been identified and documented by a registered design professional specializing in traffic engineering.</u> The fire code official <u>is authorized to approve such traffic calming devices provided that, in the opinion of the fire code official, adequate emergency vehicle access is maintained.</u> ~~and the jurisdiction's traffic engineer shall work collaboratively to plan, design, and install traffic calming devices. Approved traffic calming devices shall be designed to provide for adequate emergency vehicle access in addition to mitigating unsafe traffic conditions identified by the traffic engineer.~~

Committee Reason: The committee approved the code change because it lets the fire code official know that he is not operating alone, that there are other parties with an interest in traffic calming devices that need to have input and provides broader opportunities for cooperation. The modification uses the proper terminology for design professionals as is used elsewhere in the code and the revised wording provides the fire code official more flexibility than the original proposal for addressing the various types of traffic calming devices that may be proposed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Ryan, representing City of Overland Park, KS, requests Disapproval.

Commenter's Reason: Traffic calming design is used specifically for traffic safety particularly in residential neighborhoods. This level of safety usually is addressed by traffic engineers who use other standards such as AWPA and National Highway Patrol standards. Concerns should be addressed to those organizations to deal with traffic design.

F42-13
Final Action: AS AM AMPC____ D

F45-13
507.4, Chapter 80

Proposed Change as Submitted

Proponent: Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

507.4 Water supply test date and information. The water supply test used for hydraulic calculation of fire protection systems shall be conducted in accordance with NFPA 291 and within one year of sprinkler plan submittal, or as otherwise approved by the fire code official. The fire code official shall be notified prior to the water supply test. Water supply tests shall be witnessed by the fire code official, as required ~~or approved documentation of the test shall be provided to the fire code official prior to final approval of the water supply system~~. The exact location of the static/residual hydrant and the flow hydrant shall be indicated on the design drawings. All fire protection plan submittals shall be accompanied by waterflow test report information, or as otherwise approved by the fire code official. At a minimum, the waterflow test report shall indicate the documented fluctuation of the water supply system in question, in accordance with the water supply operator or authority, for an entire year. The fire protection designer shall then design the fire protection system including this fluctuation information, in accordance with the applicable referenced NFPA standard.

Add new standard to Chapter 80 as follows:

NFPA

291-13 *Recommended Practice for Fire Flow Testing and Marking of Hydrants* 507.4

Reason: Water supply system fluctuation is regularly ignored in fire protection design. Often times, a sprinkler system is designed based on a fire hydrant flow test that only represents one point in time throughout the year when water supply systems may fluctuate up to 50 psi in some areas or more, based on summer vs. winter demands of the systems. This information is critical to ensure that such fire protection systems are designed to account for this potential fluctuation.

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

Analysis: A review of the standard proposed for inclusion in the code, NFPA 291-13, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

507.4-F-MORGAN

Committee Action Hearing Results

For staff analysis of the content of NFPA 291-13 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Disapproved**

Committee Reason: The committee's disapproval was based on the fact that the code change belongs in Chapter 9 since its focus is on fire protection system calculations rather than on fire protection water supply. Also, gathering an entire year of test data can be problematic in areas of the country where testing can only be done for 4 or 5 months out of the year due to weather extremes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob D. Morgan, P.E., Fort Worth Fire Dept., representing Fire Advisory Board to North Central Texas Council of Governments, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

903.3.5 Water supplies. Water supplies for *automatic sprinkler systems* shall comply with this section and the standards referenced in Section 903.3.1. The potable water supply shall be protected against backflow in accordance with the requirements of this section and the *International Plumbing Code*. <u>For connections to public waterworks systems, the water supply test used for design of fire protection systems shall be adjusted to account for seasonal and daily pressure fluctuations based on information from the water supply authority and as approved by the fire code official.</u>

Commenter's Reason: This public comment replaces the original proposal by relocating the new wording to Chapter 9, as per the committee's reason statement for Disapproval. There is no longer a proposed change to Section 507.4, but rather to Section 903.3.5. Also, such information on pressure fluctuation is not only necessary to ensure that the minimum required pressure will be available for the fire sprinkler system, but also, to ensure that high pressures do not exceed boundaries of the sprinkler system. If the water pressure on a sprinkler system exceeds 100 psi, changes in the hanging methods are required. Also, if a fire pump is provided, it might be possible to exceed 175 psi, which is typically considered the maximum working pressure for a sprinkler system. These are just additional reasons for why it is critical to account for pressure fluctuations in the water supply. Obviously, fire flows can be affected by this, as well as other water-based fire protection systems, such as standpipes, which require a minimum 100 psi at the roof of high-rise buildings, and such may not be available due to pressure fluctuations. That is why the original proposal was made to water supply tests in general, in addition to the fact, that one would usually acquire that information at the time of water supply testing. However, the above public comment relocates the change to the applicable section of 903 to satisfy the committee's request. With regards to gathering of data, the above code change simply requires that pressure fluctuations be addressed as per the water supply authority, i.e. to the extent that such information is available, and further allows the fire code official to accept otherwise.

F45-13
Final Action: AS AM AMPC____ D

F54-13
604.1.2 (New) (IBC [F] 2702.1.2), Chapter 80

Proposed Change as Submitted

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov)

Add new text as follows:

604.1.1(IBC [F] 2702.1.1) Stationary generators. Stationary emergency and standby power generators required by this code shall be *listed* in accordance with UL 2200

604.1.2 (IBC [F] 2702.1.2) Group I-2 Occupancies. In Group I-2 occupancies, where an essential electrical system is located in flood hazard areas established in Section 1612.3 of the *International Building Code*, the system shall be located and installed in accordance with ASCE 24.

Add new standard to Chapter 80 as follows:

ASCE 24-05	Flood Resistant Design and Construction	604.1.2

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 5 open meetings and over 80 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

There is no way to get to the requirements or limitations regarding generator placement for healthcare facilities that are in the standard if the code text for the specific code section does not take you there.

The Adhoc committee on healthcare identified this coordination oversight as it has been identified in healthcare facilities and that generators are being installed in areas subject to flooding, and although they were designed to meet the structural loads for the flooding, they would operationally fail.

There is no cost impact for these requirements because the compliance with ASCE 24 is required for these facilities; specific reference to ASCE for coordination of requirements applicable to healthcare facilities that require emergency or standby power systems per federal, state and licensing agency requirements and references. Also, both this section and this proposal are not intended to be retroactive in application. The AHC has a separate code change that would require facilities to do a risk assessment of existing installations.

It is an installation construction requirement that is not specifically addressed in the code; emergency and standby power by generators is necessary for life safety and preservation for healthcare and for other occupancies and uses as specified in 2702.

Note that G80-12 added requirements for essential electrical systems in I-2 occupancies. This is simply a continuation of that concept. This proposal is furthering the reliability of the essential electrical systems when they will be needed most by specifically referencing to ASCE 24. The additional language referencing Section 1612.3 is similar to that used in Section 3001.2 for elevators.

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

Analysis: The standard proposed for inclusion in the code, ASCE 24-05, is currently referenced in the IBC. An update in the year edition of that standard will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

604.1.2 (NEW)-F-WILLIAMS-ADHOC

Committee Action Hearing Results

For staff analysis of the content of ASCE/SEI 24-05 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Approved as Modified**

Modify the proposal as follows:

604.1.2 (IBC [F] 2702.1.2) Group I-2 Occupancies. In Group I-2 occupancies, in new construction or where the building is substantially damaged, where an essential electrical system is located in flood hazard areas established in Section 1612.3 of the *International Building Code*, the system shall be located and installed in accordance with ASCE 24.

(Portions of proposal not shown remain unchanged.)

Committee Reason: The committee approved the code change based on the proponent's reason statement and agreed that the proposal provides for important protection for critical systems. The modification clarifies that the applicability of the section would be to existing buildings only when they sustain substantial damage such as from the recent east coast hurricane.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

604.1.2 (IBC [F] 2702.1.2) Group I-2 Occupancies. In Group I-2 occupancies~~, in new construction or where the building is substantially damaged~~, where an essential electrical system is located in flood hazard areas established in Section 1612.3 of the *International Building Code*, and where new or replacement essential electrical system generators are installed, the system shall be located and installed in accordance with ASCE 24.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: The Adhoc committee recommends that generators be protected from floods sooner than when a building is substantially damaged. However, the Adhoc committee did not feel that generators should have to be protected if a flood plane was revised and no alterations were planned at that time. This modification will work with the hospital hazard vulnerability analysis and risk assessments. We believe that this proposal would require modifications when a substantial change is contemplated the trigger being the generator.

F54-13
Final Action: AS AM AMPC____ D

F55-13
604.2.14.1.3 (IBC [F] 403.4.8.2) (New)

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com)

Add new text as follows:

604.2.14.1 (IBC [F] 403.4.8.1) Standby power. A standby power system shall be provided. Where the standby system is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour fire barriers constructed in accordance with Section 707 of the International Building Code or horizontal assemblies constructed in accordance with Section 711 of the International Building Code, or both. System supervision with manual start and transfer features shall be provided at the fire command center.

604.2.14.1.1 Fuel supply. (No change to current text.)

604.2.14.1.2 Capacity. (No change to current text.)

<u>**604.2.14.1.3 (IBC [F] 403.4.8.2) Fuel line piping protection**: Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by fire barriers or by an approved piping protective system that have a fire-resistance rating of not less than 2 hours. Where gypsum wallboard is used, joints on the piping side of the enclosure are not required to be taped. Access openings into the enclosure shall be protected by approved fire protection-rated assemblies.</u>

(Renumber subsequent sections)

Reason: Currently IFC Section 604.2.14.1 and IBC Section [F] 403.4.8.1 require the generator to be protected from a fire within the occupancy by enclosure with 2 hour fire-resistance rated construction.

However, for diesel fueled generators it is common to supply the generators with a day tank and resupply the day tank via remote fuel oil tanks and the fuel line piping from those remote tanks to the generator can be exposed to the fire the generator has been protected against. Loss of the fuel line due to fire exposure has the same impact as loss of the generator itself from fire exposure. The wording only refers to "fuel lines' to also provide protection in those cases where a gaseous fuel supply is approved for use.

This proposal calls for fire-resistance protection of those portions of the fuel line piping that are located outside of the fire-resistance rated room the generator is located in. A portion of the new language was taken from IBC Section [F]415.10.6.4 where protection of HPM supply piping is provided for.

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

604.2.14.1.3 (NEW)-F-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee's disapproval was based on its concern that rather than simply requiring a 2-hour fire-resistance-rated assembly, the proposal specifies methods and materials that may or not be consistent with a 2-hour rated assembly. The committee also felt that there was inadequate justification for the change and noted that sprinkler protection was not credited in reducing the hazard of fire exposure cited in the reason statement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert J Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

604.2.14.1.3 (IBC [F] 403.4.8.2) Fuel line piping protection: Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in ~~by fire barriers or by~~ an approved ~~piping protective system~~ method or assembly that ~~have~~ has a fire-resistance rating of not less than 2 hours~~. Where gypsum wallboard is used, joints on the piping side of the enclosure are not required to be taped. Access openings into the enclosure shall be protected by approved fire protection-rated assemblies.~~ Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 the required fire-resistance rating may be reduced to 1 hour.

Commenter's Reason: In response to the committee concerns the specific methods have been deleted to instead refer to a generic requirement of protection with "an approved method or assembly". In recognition of the committee discussion this modified wording provides for acceptance of a wider base of solutions.

Recognition for sprinkler protection has been added with a reduction of the 2 hour protection to 1 hour when the building is protected throughout by an automatic sprinkler system in response to committee concerns.

Though there was one committee member that did not see the need for the protection, there were several members that agreed with the concept, but not the language that was initially proposed.

F55-13

Final Action: AS AM AMPC____ D

F57-13

604.3 (New) [IBC [F] 2702.3 (New)]; Chapter 80 (IBC Chapter 35)

Proposed Change as Submitted

Proponent: Bob Eugene, representing Underwriters Laboratories (Robert.Eugene@ul.com)

Add new text as follows:

604.3 (IBC [F] 2702.3) Critical circuits. Cables used for survivability of critical circuits shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

(Renumber subsequent sections)

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

UL

2196-2001 Tests for Fire Resistive Cables, with revisions through December 7, 2003...604.3 (2703.2)

Reason: UL 2196 is the ANSI approved standard for tests of fire resistive cables. NFPA 20 (fire pumps) and NFPA 72 (fire alarm) include selective survivability requirements to assure integrity of certain critical circuits. NFPA 70 does not specify the applicable standard within the mandatory provisions of the code, but recognizes electrical circuit protective systems as an alternate to listed cables. An electrical circuit protective system is a field assembly of components that must be installed according to the listing requirements and manufacturer's instructions in order to maintain the listing for the system. There are more than two dozen electrical circuit protective systems listed in the UL Fire Resistance Directory.

Cost Impact: The code change proposal may or may not increase the cost of construction. Such systems are already commonly installed.

604.3 (NEW)-F-EUGENE

Committee Action Hearing Results

For staff analysis of the content of UL2196-2001 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Approved as Modified**

Modify the proposal as follows:

604.3 (IBC [F] 2702.3) Critical circuits. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee agreed with the proponent's reason statement that the code change
Brings needed clarity regarding critical circuits and provides correlation with similar language used in many referenced standards, including NFPA 20, 70 and 72. Though the committee expressed some concern that the term "critical circuits" is not defined, it was pointed out that the phrase is widely used and described throughout nationally recognized standards and industry practices. The modification clarifies that the requirement only applies to required critical circuits.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Bob Eugene, representing UL LLC, requests Approval as Modified by Public Comment.

Further modify the proposal as follows:

UL	**Underwriters Laboratories**	
Standard Reference Number	**Title**	**Referenced in Code Section Number**
2196-2001	Tests for Fire Resistive Cables, with revisions through ~~December 7, 2003~~ March 2012	604.3 (2703.2)

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This proposal was originally submitted with the Group A proposals, but held over for the Group B proposals. The revisions to the standard, including ANSI approval, occurred after the original submittal and should be included in the 2015 edition of the codes.

Analysis: The edition of UL2196 that was submitted for review by the IFC Committee included the revisions through March, 2012. For the staff analysis of the content of this standard, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Public Comment 2:

Marcelo M. Hirschler, (GBH International), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

SECTION 202
GENERAL DEFINITIONS

Add new definition as follows:

CRITICAL CIRCUIT. A **c**ircuit that requires continuous operation to ensure safety of the structure and occupants.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: During the proposal stage an issue was raised by the committee that the term "critical circuit" is not defined. This proposed definition is based on the definitions in section 645.2 and 708.2 of the National Electrical Code (NFPA 70), which read as shown below. Article 645 deals with Information Technology Equipment and article 708 deals with Critical Operations Power Systems.

> **645.2: Critical Operations Data System.** An information technology equipment system that requires continuous operation for reasons of public safety, emergency management, national security, or business continuity.
>
> **708.2: Critical Operations Power Systems (COPS).** Power systems for facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security, or business continuity.

The National Electrical Code also states, in article 725 that:

> **Circuit Integrity (CI) Cable.** Cable(s) used for remote control, signaling, or power-limited systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions.
>
> **Circuit Integrity (CI) Cable or Electrical Circuit Protective System.** Cables used for survivability of critical circuits shall be listed as circuit integrity (CI) cable. Cables specified in 725.154(A), (B), (D)(1), and (E), and used for circuit integrity, shall have the additional classification using the suffix "-CI". Cables that are part of a listed electrical circuit protective system shall be considered to meet the requirements of survivability.

Informational Note: One method of defining *circuit integrity* is by establishing a minimum 2-hour fire resistance rating when tested in accordance with UL 2196-2002, *Standard for Tests of Fire Resistive Cables*.

The same concept is shown in several articles, including 760, 770 and 800.

F57-13

Final Action: AS AM AMPC____ D

F59-13, Part I

604 (IBC [F] 2702) among others; 907.5.2.2.5 (IBC [F] 907.5.2.2.5); IMC [F] 513.11, [F]513.11.1 (New); IWUIC 404.10.3; IEBC 805.4.5

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IFC COMMITTEE AND PART II WILL BE HEARD BY THE IEBC COMMITTEE AS TWO SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THOSE COMMITTEES.

PART I – INTERNATIONAL FIRE CODE

EMERGENCY VOICE/ALARM COMMUNICATION SYSTEMS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 402.7.3 Emergency ~~Standby~~ power. *Covered mall buildings* greater than 50,000 square feet (4645 m2) in area and *open mall buildings* greater than 50,000 square feet (4645 m2) within the established perimeter line shall be provided with ~~standby~~ emergency power ~~systems~~ that is ~~are~~ capable of operating the *emergency voice/alarm communication system* in accordance with Section 2702.

[F] 907.5.2.2.5 Emergency power. Emergency voice/alarm communications systems shall be provided with ~~an *approved*~~ emergency power ~~source~~ in accordance with Section 2702. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[F] ~~2702.2.1 Group A occupancies.~~ ~~Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with Section 907.5.2.2.4.~~

[F] ~~2702.2.14 Covered and open mall buildings.~~ ~~Standby power shall be provided for voice/alarm communication systems in *covered and open mall buildings* in accordance with Section 402.7.3.~~

[F] 2702.2.1 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

Revise the IFC as follows:

~~**604.2.1 Group A occupancies.** Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with Section 907.2.1.1.~~

~~**604.2.13 Covered and open mall buildings.** Covered mall buildings exceeding 50,000 square feet (4645 m2) and open mall buildings exceeding 50,000 square feet (4645 m2) within the established perimeter line shall be provided with standby power systems that are capable of operating the emergency voice/alarm communication system.~~

604.2.1 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. 5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

907.5.2.2.5 Emergency power. Emergency voice/alarm communications systems shall be provided with ~~an *approved*~~ emergency power ~~source~~ in accordance with Section 604. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

SMOKE CONTROL SYSTEMS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 404.7 Standby power. Equipment required to provide smoke control shall be provided with standby power in accordance with ~~connected to a standby power system in accordance with~~ Section 909.11.

[F] 909.11 Standby power ~~Power systems.~~ ~~The~~ ~~s~~Smoke control systems shall be provided with standby power in accordance with Section 2702. ~~shall be supplied with two sources of power. Primary power shall be from the normal building power systems. Secondary power shall be from an approved standby source complying with Chapter 27 of this code.~~

[F] 909.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gears and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. ~~The transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power.~~

909.20.6.2 Standby power. Mechanical vestibule and *stair* shaft ventilation systems and automatic fire detection systems shall be provided with ~~powered by an *approved*~~ standby power in accordance with Section 2702. ~~system conforming to Section 403.4.8 and Chapter 27.~~

909.21.5 Standby power. The pressurization system shall be provided with standby power in accordance with Section 2702. ~~from the same source as other required emergency systems for the building.~~

[F] 2702.2.2 Smoke control systems. Standby power shall be provided for smoke control systems as required in ~~in accordance with~~ Sections 404.7, 909.11, 909.20.6.2, and 909.21.5.

[F] ~~2702.2.20 Smokeproof enclosures.~~ ~~Standby power shall be provided for smokeproof enclosures as required by~~ in ~~Section 909.20.6.2.~~

Revise the IFC as follows:

604.2.2 Smoke control systems. Standby power shall be provided for smoke control systems as required in ~~in accordance with~~ Section 909.11.

909.11 Standby power ~~Power systems.~~ ~~The~~ ~~s~~Smoke control systems shall be provided with standby power in accordance with Section 2702. ~~shall be supplied with two sources of power. Primary power shall be from the normal building power systems. Secondary power shall be from an approved standby source complying with Chapter 27 of this code.~~

909.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gears and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. ~~The transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power.~~

Revise the IMC as follows:

[F] 513.11 Power systems. ~~The s~~Smoke control system shall be supplied with standby power in accordance with Section 2702 of the International Building Code. ~~two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an *approved* standby source complying with Chapter 27 of the *International Building Code*.~~

[F] 513.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gear and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour fire-resistance rated fire barriers constructed in accordance with Section 707 of the *International Building Code* or horizontal assemblies constructed in accordance with Section 711 of the *International Building Code*, or both. Power distribution from the two sources shall be by independent routes. ~~Transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with NFPA 70.~~

EXIT SIGNS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 2702.2.3 Exit signs. Emergency power shall be provided for *exit* signs as required in ~~in accordance with~~ Section 1011.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

Revise the IFC as follows:

604.2.3 Exit signs. Emergency power shall be provided for *exit* signs as required in ~~in accordance with~~ Section 1011.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

MEANS OF EGRESS ILLUMINATION

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 2702.2.4 Means of egress illumination. Emergency power shall be provided for *means of egress* illumination as required in ~~in accordance with~~ Section 1006.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

Revise the IFC as follows:

604.2.4 Means of egress illumination. Emergency power shall be provided for *means of egress* illumination in accordance with Sections 1006.3 and 1104.5.1.

1104.5.1 Emergency power duration and installation. Emergency power for means of egress illumination shall be provided in accordance with Section 604. In other than Group I-2, ~~the~~ emergency power ~~system shall provide power~~ shall be provided for not less than 60 minutes. ~~and consist of storage batteries, unit equipment or an on-site generator.~~ In Group I-2, ~~the~~ emergency power ~~system shall provide power~~ shall be provided for not less than 90 minutes. ~~and consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 604.~~

ELEVATORS AND PLATFORM LIFTS

***NOTE:** The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 2702.2.5 Elevators and platform lifts. Standby power shall be provided for elevators and platform lifts as required in Sections 1007.4, 1007.5, 3003.1, 3007.9 and 3008.9.

[F] ~~**2702.2.5 Accessible means of egress elevators.** Standby power shall be provided for elevators that are part of an *accessible means of egress* in accordance with Section 1007.4.~~

[F] ~~**2702.2.6 Accessible means of egress platform lifts.** Standby power in accordance with this section or ASME A 18.1 shall be provided for platform lifts that are part of an *accessible means of egress* in accordance with Section 1007.5.~~

[F] ~~**2702.2.19 Elevators.** Standby power for elevators shall be provided as set forth in Sections 3003.1, 3007.9 and 3008.9.~~

Revise the IFC as follows:

~~**604.2.5 Accessible means of egress elevators.** Standby power shall be provided for elevators that are part of an accessible *means of egress* in accordance with Section 1007.4.~~

~~**604.2.6 Accessible means of egress platform lifts.** Standby power in accordance with this section or ASME A18.1 shall be provided for platform lifts that are part of an accessible *means of egress* in accordance with Section 1007.5.~~

604.2.18 Elevators and platform lifts. Standby power shall be provided for elevators and platform lifts as required in Sections 607.2, 1007.4, and 1007.5.

Relocate IFC sections and renumber the remaining sections.

607.2 Standby power. ~~**604.2.18 Elevators.**~~ In buildings and structures where standby power is required or furnished to operate an elevator, standby power shall be provided in accordance with Section 604. ~~the o~~Operation of the system shall be in accordance with Sections ~~604.2.18.1 through 604.2.18.4~~ 607.2.1 through 607.2.4.

607.2.1 ~~**604.2.18.1**~~ **Manual transfer.** (No change to current text.)

607.2.2 ~~**604.2.18.2**~~ **One elevator.** (No change to current text.)

607.2.3 ~~**604.2.18.3**~~ **Two or more elevators.** (No change to current text.)

607.2.4 ~~**604.2.18.4**~~ **Machine room ventilation.** (No change to current text.)

HORIZONTAL SLIDING DOORS

***NOTE:** The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 2702.2.7 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors as required in ~~in accordance with~~ Section 1008.1.4.3. The standby power supply shall have a capacity to operate a minimum of 50 closing cycles of the door.

Revise the IFC as follows:

604.2.7 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors as required in ~~in accordance with~~ Section 1008.1.4.3. The standby power supply shall have a capacity to operate a minimum of 50 closing cycles of the door.

MEMBRANE STRUCTURES

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 2702.2.9 Membrane structures. Standby power shall be provided for auxiliary inflation systems in permanent membrane structures as required in ~~in accordance with~~ Section 3102.8.2. Standby power shall be provided for a duration of not less than four hours. Auxiliary inflation systems in temporary air-supported and air-inflated membrane structures shall be provided in accordance with Section 3103.10.4 of ~~Emergency power shall be provided for *exit* signs in temporary tents and membrane structures in accordance with~~ the *International Fire Code*.

Revise the IFC as follows:

604.2.9 Membrane structures. ~~Emergency power shall be provided for *exit* signs in temporary tents and membrane structures in accordance with Section 3103.12.6.1.~~
Standby power shall be provided for auxiliary inflation systems in permanent membrane structures in accordance with Section 2702 of the *International Building Code*. Auxiliary inflation systems shall be provided in temporary air-supported and air-inflated membrane structures in accordance with Section 3103.10.4.

3103.10.4 Auxiliary inflation systems ~~power~~. Places of public assembly for more than 200 persons shall be furnished with an auxiliary inflation system capable of powering a blower with the capacity to maintain full inflation pressure with normal leakage in accordance with Section 3103.10.3 for a minimum duration of four hours. The auxiliary inflation system can be either a fully automatic auxiliary engine-generator set ~~capable of powering one blower continuously for 4 hours,~~ or a supplementary blower powered by an internal combustion engine which shall be automatic in operation. The system shall be capable of automatically operating the required blowers at full power within 60 seconds of a commercial power failure.

SEMICONDUCTOR FABRICATION FACILITIES

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 415.10.10 Emergency power system. An emergency power system shall be provided in Group H-5 occupancies in accordance with Section 2702. ~~where required in Section 415.10.10.1.~~ The emergency power system shall ~~be designed to~~ supply power automatically to ~~required~~ the electrical systems specified in Section 415.10.10.1 when the normal electrical supply system is interrupted.

[F] 415.10.10.1 Required electrical systems. Emergency power shall be provided for electrically operated equipment and connected control circuits for the following systems:

1. through 6. (No change to current text.)
7. Manual <u>and automatic</u> *fire alarm* systems.
8. through 11. (No change to current text.)

[F] 2702.2.8 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities <u>as required in</u> ~~in accordance with~~ Section 415.10.10.

Revise the IFC as follows:

604.2.8 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities <u>as required in</u> ~~in accordance with~~ Section 2703.15.

2703.15 Emergency power system. An emergency power system shall be provided in Group H-5 occupancies <u>in accordance with</u> ~~where required by~~ Section 604. The emergency power system shall ~~be designed to~~ supply power automatically to ~~required~~ <u>the</u> electrical systems <u>specified in Section 2703.15.1</u> when the normal supply system is interrupted.

HAZARDOUS MATERIALS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 414.5.3 Emergency or standby power. Where mechanical *ventilation*, treatment systems, temperature control, alarm, detection or other electrically operated systems are required by the *International Fire Code* or this code, such systems shall be provided with ~~an~~ emergency or standby power ~~system~~ in accordance with <u>Section 2702</u> ~~Chapter 27~~.~~**Exceptions:** 1.~~

[F] <u>414.5.3.1 Exempt applications</u>. Emergency or standby power are not required for ~~the following storage areas: 1.1. M~~ <u>m</u>echanical ventilation <u>systems provided</u> *for:*

1. <u>S</u>~~s~~<u>torage</u> of Class IB and Class IC flammable and combustible liquids in closed containers not exceeding 6.5 gallons (25 L) capacity.
   ~~1.2~~<u>1.1.</u> Storage ~~areas for~~ <u>of</u> Class 1 and 2 oxidizers.
   ~~1.3~~<u>1.2</u>. Storage ~~areas for~~ <u>of</u> Class II, III, IV and V organic peroxides.
   ~~1.4~~<u>1.3.</u> Storage~~, use and handling areas for~~ <u>of</u> asphyxiant, irritant and radioactive gases.
   ~~1.5. For storage, use and handling areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2 of the *International Fire Code*.~~

[F] <u>414.5.3.2 Fail-safe engineered systems.</u> <u>Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an *approved* fail-safe engineered system is installed.</u>

[F] 421.8 Standby power. Mechanical *ventilation* and gas detection systems shall be ~~connected to a~~ <u>provided with</u> standby power ~~system~~ in accordance with <u>Section 2702.</u> ~~Chapter 27.~~

[F] 2702.2.10 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials <u>as required in</u> ~~in accordance with~~ Section<u>s</u> 414.5.3 <u>and 421.8 and the *International Fire Code*</u>.

Revise the IFC as follows:

604.2.10 Hazardous materials. Emergency ~~or standby~~ power shall be provided in occupancies with hazardous materials as required in the following ~~in accordance with~~ sections ~~5004.7 and 5005.1.5.~~:

Hazardous materials – 5001.3.3.10
Highly toxic and toxic gases - 6004.2.2.8, 6004.3.4.2
Organic peroxides - 6204.1.11

5004.7 Standby or emergency power. Where mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are required, such systems shall be provided with ~~an~~ emergency or standby power ~~system~~ in accordance with ~~NFPA 70 and~~ Section 604.

~~Exceptions~~:

5004.7.1 Exempt applications. Standby or emergency power is not required for ~~M~~mechanical ventilation systems provided for:

1. Storage of Class IB and Class IC flammable and *combustible liquids* in closed containers not exceeding 61/2 gallons (25 L) capacity.
2. Storage ~~areas for~~ of Class 1 and 2 oxidizers.
3. Storage ~~areas for~~ of Class II, III, IV and V organic peroxides.
4. Storage ~~areas for~~ of asphyxiant, irritant and radioactive gases.
5. ~~For storage areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2.~~

5004.7.2 Fail-safe engineered systems. ~~6.~~ Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an *approved* fail-safe engineered system is installed.

5005.1.5 Standby or emergency power. Where mechanical ventilation, treatment systems, temperature control, manual alarm, detection or other electrically operated systems are required in this code, such systems shall be provided with ~~an~~ emergency or standby power ~~system~~ in accordance with ~~NFPA 70 and~~ Section 604.

~~Exceptions:~~ ~~1.~~

5005.1.5.1 Exempt applications. Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an *approved* fail-safe engineered system is installed.

2. ~~Systems for highly toxic or toxic gases shall be provided with emergency power in accordance with Sections 6004.2.2.8 and 6004.3.4.2.~~

6004.2.2.8 Emergency power. Emergency power shall be provided for the following systems in accordance with the Section 604~~. and NFPA 70 shall be provided in lieu of standby power where any of the following systems are required~~:

1. through 7. *(No change to current text.)*

6004.2.2.8.1 Fail-safe engineered systems. **~~Exception:~~** Emergency power ~~is~~ shall not be required for mechanical exhaust ventilation, treatment systems and temperature control systems where *approved* fail-safe engineered systems are installed.

6204.1.11 Standby power. Standby power ~~in accordance with Section 604 shall be provided for storage areas of Class I and unclassified detonable organic peroxide.~~ shall be provided in accordance with

Section 604 for the following systems used to protect Class I and unclassified detonable organic peroxide:

1. through 7. *(No change to current text.)*

6204.1.11.1 Fail-safe engineered systems. ~~**Exception:**~~ Standby power shall not be required for mechanical exhaust ventilation, treatment systems and temperature control systems where *approved* fail-safe engineered systems are installed.

HIGH RISE BUILDINGS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 403.4.8 Standby and emergency power. A standby power system complying with Section 2702 ~~Chapter 27~~ and Section 3003 shall be provided for the standby power loads specified in 403.4.8.2. An emergency power system complying with Section 2702 shall be provided for the emergency power loads specified in Section 403.4.8.3.~~Where elevators are provided in a *high-rise building* for *accessible means of egress*, fire service access or occupant self-evacuation, the standby power system shall also comply with Sections 1007.4, 3007 or 3008, as applicable.~~

[F] 403.4.8.1 Equipment room. ~~**Special requirements for standby power systems.**~~ If the standby or emergency power system includes ~~is~~ a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.

[F] 403.4.8.2 Standby power loads. The following are classified as standby power loads:

1. Power and lighting for the *fire command center* required by Section 403.4.6;
2. *Ventilation* and automatic fire detection equipment for *smokeproof enclosures*; and
3. Elevators.
4. Where elevators are provided in a *high-rise building* for *accessible means of egress*, fire service access or occupant self-evacuation, the standby power system shall also comply with Sections 1007.4, 3007 or 3008, as applicable.

[F] ~~**403.4.9 Emergency power systems.** An emergency power system complying with Chapter 27 shall be provided for emergency power loads specified in Section 403.4.9.1.~~

[F] ~~**403.4.9.1**~~ **403.4.8.3 Emergency power loads.** The following are classified as emergency power loads:

1. Exit signs and *means of egress* illumination required by Chapter 10;
2. Elevator car lighting;
3. *Emergency voice/alarm communications systems*;
4. Automatic fire detection systems;
5. *Fire alarm* systems; and
6. Electrically powered fire pumps.

[F] 2702.2.15 High-rise buildings. Emergency and standby power systems shall be provided in high-rise buildings as required in ~~in accordance with~~ Section~~s~~ 403.4.8~~ and 403.4.9~~.

Revise the IFC as follows:

604.2.14 High-rise buildings. Standby power and emergency power ~~, light and emergency systems in high-rise buildings~~ shall be provided as required in Section 403 of the International Building Code, and shall be in accordance with Section 604. ~~comply with the requirements of Sections 604.2.14.1 through 604.2.14.3.~~

~~**604.2.14.1 Standby power.** A standby power system shall be provided. Where the standby system is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 of the *International Building Code* or *horizontal assemblies* constructed in accordance with Section 711 of the *International Building Code*, or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.~~

~~**604.2.14.1.1 Fuel supply.** An on-premises fuel supply, sufficient for not less than 2-hour full-demand operation of the system, shall be provided.~~
~~**Exception:** When *approved*, the system shall be allowed to be supplied by natural gas pipelines.~~

~~**604.2.14.1.2 Capacity.** The standby system shall have a capacity and rating that supplies all equipment required to be operational at the same time. The generating capacity is not required to be sized to operate all of the connected electrical equipment simultaneously.~~

~~**604.2.14.1.3 Connected facilities.** Power and lighting facilities for the *fire command center* and elevators specified in Sections 403.4.8.2 and 403.6 of the *International Building Code*, as applicable, shall be transferable to the standby source. Standby power shall be provided for at least one elevator to serve all floors and be transferable to any elevator.~~

~~**604.2.14.2 Separate circuits and luminaires.** Separate lighting circuits and luminaires shall be required to provide sufficient light with an intensity of not less than 1 footcandle (11 lux) measured at floor level in all *means of egress corridors*, *stairways*, smokeproof enclosures, elevator cars and lobbies, and other areas that are clearly a part of the escape route.~~

~~**604.2.14.2.1 Other circuits.** Circuits supplying lighting for the *fire command center* and mechanical equipment rooms shall be transferable to the standby source.~~

~~**604.2.14.3 Emergency systems.** *Exit* signs, *exit* illumination as required by Chapter 10, electrically powered fire pumps required to maintain pressure, and elevator car lighting are classified as emergency systems and shall operate within 10 seconds of failure of the normal power supply and shall be capable of being transferred to the standby source.~~

> ~~**Exception:** *Exit* sign, *exit* and *means of egress* illumination are permitted to be powered by a standby source in buildings of Group F and S occupancies.~~

UNDERGROUND BUILDINGS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 405.8 Standby and emergency power. A standby power system complying with Section 2702 ~~Chapter 27~~ shall be provided for the standby power loads specified in Section 405.8.1. An emergency power system complying with Section 2702 shall be provided for the emergency power loads specified in Section 405.8.2.

[F] 405.8.1 Standby power loads. The following loads are classified as standby power loads:

1. Smoke control system.
2. *Ventilation* and automatic fire detection equipment for *smokeproof enclosures.*
3. Fire pumps.
4. ~~Standby power shall be provided for e~~Elevators, as required in ~~in accordance with~~ Section 3003.

[F] ~~405.8.2 Pick-up time.~~ ~~The standby power system shall pick up its connected loads within 60 seconds of failure of the normal power supply.~~

[F] ~~405.9 Emergency power.~~ ~~An emergency power system complying with Chapter 27 shall be provided for emergency power loads specified in Section 405.9.1.~~

[F] ~~405.9.1~~ 405.8.2 Emergency power loads. The following loads are classified as emergency power loads:

1. through 5. *(No change to current text.)*

[F] 2702.2.16 Underground buildings. Emergency and standby power shall be provided in underground buildings as required in ~~in accordance with~~ Sections 405~~.8 and 405.9~~.

Revise the IFC as follows:

604.2.15 Underground buildings. Emergency and standby power ~~systems~~ shall be provided in underground buildings ~~covered~~ as required in ~~Chapter 4~~ Section 405 of the *International Building Code* ~~shall comply with Sections 604.2.15.1 and 604.2.15.2.~~ and shall be in accordance with Section 604.

~~**604.2.15.1 Standby power.** A standby power system complying with this section and NFPA 70 shall be provided for standby power loads as specified in Section 604.2.15.1.1.~~

~~**604.2.15.1.1 Standby power loads.** The following loads are classified as standby power loads:~~

1. ~~Smoke control system.~~
2. ~~Ventilation and automatic fire detection equipment for smokeproof enclosures.~~
3. ~~Fire pumps.~~
4. ~~Standby power shall be provided for elevators in accordance with Section 3003 of the *International Building Code*.~~

~~**604.2.15.1.2 Pickup time.** The standby power system shall pick up its connected loads within 60 seconds of failure of the normal power supply.~~

~~**604.2.15.2 Emergency power.** An emergency power system complying with this code and NFPA 70 shall be provided for emergency power loads as specified in Section 604.2.15.2.1.~~

~~**604.2.15.2.1 Emergency power loads.** The following loads are classified as emergency power loads:~~

1. ~~Emergency voice/alarm communication systems.~~
2. ~~Fire alarm systems.~~
3. ~~Automatic fire detection systems.~~
4. ~~Elevator car lighting.~~
5. ~~*Means of egress* lighting and *exit* sign illumination as required by Chapter 10.~~

GROUP I-3 OCCUPANCY DOOR LOCKS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part. See Part XX for this subject in the IEBC.*

Revise the IBC as follows:

[F] 408.4.2 Power-operated doors and locks. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at
the door<u>. Emergency power shall be provided for the doors and locks in accordance with Section 2702.</u>
~~and either emergency power or a remote mechanical operating release shall be provided.~~

Exception<u>s</u>:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1.
2. <u>Emergency power is not required when remote mechanical operating releases are provided.</u>

[F] 2702.2.17 Group I-3 occupancies. Emergency power shall be provided for <u>power operated</u> doors <u>and locks</u> in Group I-3 occupancies <u>as required in</u> ~~in accordance with~~ Section 408.4.2.

Revise the IFC as follows:

604.2.16 Group I-3 occupancies. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at
the door<u>. Emergency power shall be provided for the doors and locks in accordance with Section 604.</u>
~~and either emergency power or a remote mechanical operating release shall be provided.~~

Exception<u>s</u>:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1.
2. <u>Emergency power is not required when remote mechanical operating releases are provided.</u>

AIRPORT TRAFFIC CONTROL TOWERS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

~~**[F] 2702.2.18 Airport traffic control towers.** Standby power shall be provided in airport traffic control towers in accordance with Section 412.3.4.~~

~~**[F] 412.3.4 Standby power.** A standby power system that conforms to Chapter 27 shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height.~~
~~Power shall be provided to the following equipment:~~

1. ~~Pressurization equipment, mechanical equipment and lighting.~~
2. ~~Elevator operating equipment.~~
3. ~~*Fire alarm* and smoke detection systems.~~

Revise the IFC as follows:

~~**604.2.17 Airport traffic control towers.** A standby power system shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:~~

1. ~~Pressurization equipment, mechanical equipment and lighting.~~
2. ~~Elevator operating equipment.~~
3. ~~Fire alarm and smoke detection systems.~~

SMOKE ALARMS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 907.2.11.4 Power source. In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system<u> in accordance with Section 2702</u>. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

> **Exception:** Smoke alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system <u>that complies with Section 2702.</u>

Revise the IFC as follows:

907.2.11.4 Power source. In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery back-up shall be connected to an emergency electrical system <u>in accordance with Section 604</u>. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

> **Exception:** Smoke alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system <u>that complies with Section 604.</u>

EMERGENCY ALARM SYSTEMS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] <u>**414.7.4 Emergency alarm systems.** *Emergency alarm systems* shall be provided with emergency power in accordance with Section 2702.</u>

[F] <u>**2702.2.21 Emergency alarm systems.** Emergency power shall be provided for emergency alarm systems as required by Section 414.7.4.</u>

Revise the IFC as follows:

604.2.19 Emergency alarm systems. Emergency power shall be provided for emergency alarm systems as required by Section 414 of the International Building Code.

EMERGENCY RESPONDER RADIO COVERAGE SYSTEMS

NOTE: *The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "**907.5.2 (IBC [F] 907.5.2)**" or "**1011.6.3 (IFC [B] 1011.6.3**"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Add a new Section 2702.2.21 to the IBC as follows:

[F] 2702.2.21 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems required in Section 915 and the *International Fire Code*. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

Revise the IFC as follows:

510.4.2.3 Standby power. ~~Secondary power.~~ Emergency responder radio coverage systems shall be provided with ~~an *approved* secondary source of~~ standby power in accordance with Section 604. The ~~secondary~~ standby power supply shall be capable of operating the emergency responder radio coverage system for a ~~period of at least~~ duration of not less than 24 hours. ~~When primary power is lost, the power supply to the emergency responder radio coverage system shall automatically transfer to the secondary power supply.~~

604.2.19 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems as required in Section 510.4.2.3. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

FLARING SYSTEMS FOR MECHANICAL REFRIGERATION

Revise the IFC as follows:

606.12.5 Flaring systems. Flaring systems for incineration of flammable refrigerants shall be designed to incinerate the entire discharge. The products of refrigerant incineration shall not pose health or environmental hazards. Incineration shall be automatic upon initiation of discharge, shall be designed to prevent blowback and shall not expose structures or materials to threat of fire. Standby fuel, such as LP gas, and standby power shall have the capacity to operate for one and one-half the required time for complete incineration of refrigerant in the system. Standby electrical power, where required to complete the incineration process, shall be in accordance with Section 604.

WATER SUPPLY POWER

Revise the IWUIC as follows:

404.10.3 Standby power. Standby power shall be provided to pumps, controllers and related electrical equipment so that ~~S~~stationary water supply facilities within the *wildland-urban interface area* that are dependent on electrical power can provide the required ~~to meet adequate~~ water supply. The standby power system shall be ~~demands shall provide standby power systems~~ in accordance with Section 2702 ~~Chapter 27~~ of the *International Building Code*~~,~~ and Section 604 of the *International Fire Code.* ~~and NFPA 70 to ensure that an uninterrupted water supply is maintained.~~ The standby power source shall be capable of providing power for a minimum of two hours.

Exceptions: *(No change to current text.)*

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.
This proposal is part of a comprehensive rewrite of the I-Codes emergency and standby power requirements. Some edits are made to provide consistency in how standby power is referenced in the codes.

Part I - INTERNATIONAL FIRE CODE

Emergency voice/alarm communication systems: Emergency voice/alarm communication systems are required to include an emergency power source in IBC/IFC Section 907.5.2.2.5. A reference to these systems has been added to IBC 2702.2 and IFC 604.2. With the addition of this requirement it is no longer necessary to indicate that these systems are required in covered malls and Group A occupancies, which are just two of the many occupancies and building types that require emergency voice/alarm communication systems.
All reference in the IFC and IBC to emergency voice/alarm communication systems requires them to be provided with a source of emergency power, except for IBC Section 402.7.3. This oversight was corrected.

Smoke control systems: Smoke control systems are required to include a standby power source in IBC/IFC Section 909.11. In addition the IBC requires standby power to be provided for smoke control systems or components of the systems in Sections 404.7, 909.20.6.2, and 909.21.5. A reference to these section have been added to IBC 2702.2.
By referencing section 909.20.6.2 in Section 2702.2.2, it is no longer necessary to include Section 2702.2.20 smokeproof enclosure reference.
IBC/IFC 909.11and IMC 513.11 were rather lengthy and included requirements for standby power equipment rooms. These were broken off and put in Section 909.11.1 and 513.11.1. The reference to automatically transferring to standby power within 60 seconds is included in a separate code proposal for Sections 2702.1 and 604.1, and does not need to be repeated here.

Exit signs: The proposal updates references to emergency power requirements by including the appropriate IFC and IBC code sections that specify requirements for emergency power supply and operation of Exit Signs.

Means of egress illumination: Details on system components in 1006.3.1 have been eliminated because these are covered in the revised IFC Section 604.1 and IBC Section 2702.1 requirements. The last part of IFC Section 1006.3 was renumbered 1006.3.1 to match the format used in the equivalent IBC requirements.

Elevators and platform lifts: In IBC Section 2702.2 and IFC Section 604.2, references to three types of elevators or platform lifts were consolidated into a single reference to elevators and platform lifts.
Requirements for the specific rating of the standby systems required in 3007.9 and 3008.9 were removed since they are covered under another comprehensive rewrite of IBC Section 2702.1 and IFC Section 604.1.
Elevator requirements in IFC Section 604.2.18 were relocated to IFC Section 607, which covers similar elevator requirements.

Horizontal sliding doors: The requirement for the standby power supply to have a capacity to operate a minimum of 50 opening and closing cycles of the door is based on requirements in NFPA 80, Section 9.4.2.2.2.

Membrane structures: The IBC and IFC require auxiliary inflation systems to be provided for air-supported and air-inflated membrane structures. (The IBC covers permanent membrane structures and the IFC covers temporary membrane structures). The differences are that permanent air-inflated membrane structures include standby power as covered by Section 2702 of the IBC. Temporary air-inflated membrane structures are required to include an automatic engine-generator set or a blower powered by an internal combustion engine to serve as an auxiliary inflation system in the event of a commercial power failure. These are not required to be permanently installed.

Semiconductor fabrication facilities: Automatic fire alarm systems are required to be provided with emergency power, which is consistent with NFPA 72.

Hazardous materials: Reference in Section 2702 of the IBC for emergency power for pyrophoric materials to be provided in accordance with the IFC was removed since backup power is not required in IFC Chapter 64.
IBC Section 414.5.3 and IFC Section 5004.7 were reformatted with no substantive changes to the systems that do not require emergency or standby power and fail-safe engineered systems.
In IBC Section 414.5.3 the requirements to provide emergency power for ventilation systems required by the IBC (or this code) were removed. This eliminates the need to provide emergency power for normal building ventilation systems as required by Section 1203. In looking at the hazardous material related systems that require a secondary power source, they all fall under the definition of emergency power system as included in NFPA 110. Therefore reference to standby power was removed from this section.
References for emergency power were added to Sections 53, 54, 55, 57, 61 and 63 since these sections include requirements for system that require emergency power per Section 5001.3.3.10.

High rise buildings: The scope of IFC Section 604 covers emergency and standby power system, and yet sections 604.2.14.1 through 604.2.14.3 either duplicated requirements in revised Section 604.1, (covered under a separate proposal), or covered electrical system components that are not part of the standby or emergency power system. These requirements were eliminated. If the desire is to include these systems in the IFC they should be placed in a more appropriate location.

Underground buildings: Sections 604.2.15.1 through 604.2.15.2.1 duplicate some, but not all of the IBC requirements for underground buildings, and were therefore eliminated. If the desire is to include these details in the IFC they should be added in their entirety.

Group I-3 occupancy door locks: The proposal updates references to emergency power requirements by including the appropriate IFC and IFC code sections that specify requirements for emergency power supply and operation of power-operated door locks.

Airport traffic control towers: There is no reason to call out emergency and standby power requirements for aircraft traffic control towers. These requirements are specified for the types of electrical systems that will be provided, such as exit signs, egress illumination, elevators, smoke control, etc. In addition there is an error in some of the criteria since emergency power is required for fire alarm and smoke detection equipment and lighting of the means of egress. If the desire is to include a list of all possible emergency and standby power loads that can be included in these towers that can be done.

Smoke alarms: The proposal updates references to emergency power requirements by including the appropriate IFC and IBC code sections that specify requirements for emergency power supply and operation of Smoke Alarms.

Emergency alarms systems: Emergency power for emergency alarm systems is not currently required in either the IBC or the IFC, but it should be, based on the proposed definition of emergency power system.

Emergency responder radio coverage systems: Reference to standby power for emergency responder radio coverage systems was inadvertently left out of IBC Section 2702 and IFC Section 604.

Flaring systems for mechanical refrigeration: The proposal updates references to emergency power requirements by including the appropriate IFC code sections that specify requirements for emergency power supply and operation of flaring systems for mechanical refrigeration.

Clothes dryer exhaust systems: The proposal updates IMC references to stand-by power requirements by including the appropriate IBC code sections that specify requirements for stand-by power supply and operation of clothes dryer exhaust systems.

Water supply power: The proposal updates IWUI references to stand-by power requirements for pumps, controllers and related electrical equipment so that stationary water supply facilities within the *wildland-urban interface* by including the appropriate IFC and IBC code sections that specify requirements for stand-by power supply and operation of specified water supply equipment.

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

604.2.1(NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

PART I – IFC
Committee Action: Approved as Modified

Modify the proposal as follows:

HIGH-RISE BUILDINGS

IBC [F] 403.4.8.1 Equipment room. If the standby or emergency power system includes a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.

> <u>**Exception:** In Group I-2 Condition 2, manual start and transfer features for the critical branch of the emergency power are not required to be provided at the fire command center.</u>

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee approved the code change based on the proponent's reason statement and agreed that the proposal accomplishes much needed revisions and clarifications to the emergency and standby power system requirements. The modification leaves the control of critical circuits in the hands of the hospital engineers.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

[F] 414.5.3 Emergency or standby power. Where required by the International Fire Code or this code mechanical *ventilation*, treatment systems, temperature control, alarm, detection or other electrically operated systems ~~are required by the *International Fire Code* or this code, such systems~~ shall be provided with an emergency or standby power system in accordance with Section 2702.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This public comment clarifies that mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are only to be provided with an emergency or standby power system where required by the IFC or elsewhere in the IBC.

F59-13, Part I

Final Action: AS AM AMPC____ D

F59-13, Part II

604 (IBC [F] 2702) among others; 907.5.2.2.5 (IBC [F] 907.5.2.2.5); IMC [F] 513.11, [F]513.11.1 (New); IWUIC 404.10.3; IEBC 805.4.5

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IFC COMMITTEE AND PART II WILL BE HEARD BY THE IEBC COMMITTEE AS TWO SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THOSE COMMITTEES.

PART II - INTERNATIONAL EXISTING BUILDING CODE

GROUP I-3 OCCUPANCY DOOR LOCKS

Revise the IEBC as follows:

IEBC 805.4.5 Emergency power source in Group I-3. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at the door. Emergency power shall be provided for the doors and locks in accordance with Section 2702 of the International Building Code.

Exceptions:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1.
2. Emergency power is not required where remote mechanical operating releases are provided.

~~Work areas in buildings of Group I-3 occupancy having remote power unlocking capability for more than 10 locks shall be provided with an emergency power source for such locks. Power shall be arranged to operate automatically upon failure of normal power within 10 seconds and for a duration of not less than 1 hour.~~

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.
This proposal is part of a comprehensive rewrite of the I-Codes emergency and standby power requirements. Some edits are made to provide consistency in how standby power is referenced in the codes.

Part II - INTERNATIONAL EXISTING BUILDING CODE

Group I-3 occupancy door locks in the IEBC: The IEBC format was revised to more closely correlate with the IBC and IFC.

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

604.2.1(NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

PART II – IEBC
This code change was heard by the IEBC code development committee.

Committee Action: **Disapproved**

Committee Reason: This proposal was disapproved primarily related to concerns with references to sections not found in the IEBC. Specifically, exception 1 references Section 408.4.1 which is not found in the IEBC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IEBC 805.4.5 Emergency power source in Group I-3. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at the door. Emergency power shall be provided for the doors and locks in accordance with Section 2702 of the International Building Code.

Exceptions:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1 <u>of the International Building code.</u>
2. Emergency power is not required where remote mechanical operating releases are provided.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

The original proposal for F59, Part II was correctly disapproved because reference to the IBC was not included in Exception 1. This has been corrected in this public comment, which accomplishes the following:

1. Correlates the requirements for how emergency and standby power throughout the family of I-Codes so they are treated in a consistent manner.
2. Correlates the requirements for providing emergency power for power operated sliding doors or power operated locks for swinging doors with the requirements in IBC section 408.4.2, which was revised as part of proposal F59-13.

F59-13, Part II
Final Action: AS AM AMPC____ D

F62-13
605.11, 605.11.3, 605.11.3.2, 605.11.3.3

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through 605.11.4, the *International Building Code* and NFPA 70.

> ~~**Exception:** Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.~~

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.3.

> ~~**Exceptions:**~~
>
> 1. ~~Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.~~
> 2. ~~Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.~~
>
> **Exception:** Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures.

605.11.3.2 ~~Residential~~ Solar photovoltaic systems for one- and two-family dwellings. ~~Access to residential~~ Solar photovoltaic systems for one- and two-family dwellings shall ~~be provided in accordance~~ comply with Sections 605.11.3.2.1 through 605.11.3.2.~~4~~5.

605.11.3.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a 3-foot-wide (914 mm) clear access pathway.

605.11.3.2.~~1~~2 ~~Residential buildings with hip~~ Hip roof layouts. Panels~~/~~ and modules installed on ~~residential buildings~~ one- and two-family dwellings with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels~~/~~ and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

> **Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.~~2~~3 ~~Residential buildings with a s~~Single ridge roofs. Panels~~/~~ and modules installed on ~~residential buildings~~ one- and two-family dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels~~/~~ and modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.~~3~~4 ~~Residential buildings with r~~Roofs with hips and valleys. Panels~~/~~ and modules installed on ~~residential buildings~~ one- and two-family dwellings with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels/modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.~~4~~5 ~~Residential building~~ Allowance for smoke ventilation operations. Panels~~/~~ and modules installed on ~~residential buildings~~ one- and two-family dwellings shall be located no ~~higher~~ less than 3 feet (914 mm) ~~below~~ from the ridge in order to allow for fire department smoke ventilation operations.

Exception: Panels and modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

605.11.3.3 Other than ~~residential buildings~~ one- and two-family dwellings. Access to systems for occupancies other than one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.3.1 through 605.11.3.3.3.

Exception: Where it is determined by the fire code official that the roof configuration is similar to that of a one- or two-family dwelling, the residential access and ventilation requirements in Sections 605.11.3.2.1 through 605.11.3.2.4 shall be permitted to be used.

605.11.3.3.1 Access. There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof.

Exception: Where either axis of the building is 250 feet (76 200 mm) or less, ~~there~~ the clear perimeter around the edges of the roof shall be permitted to be reduced to a minimum 4-foot-wide (1290 mm) ~~clear perimeter around the edges of the roof~~.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This proposal is primarily an editorial clarification to Section 605.11.3. There is only one section which contains new text, it is Section 605.11.3.2.1. The sections and their revisions are noted below:

605.11 Exc:	This exception eliminates all requirements for solar PV systems located on Group U structures. This exception inadvertently eliminates the requirements for listing of components, marking and location of disconnects. This exception is relocated to Section 605.11.3 so that it only eliminates the requirements for access and pathways which will then retain the listing and marking requirements.
605.11.3 Exc 1:	This exception is actually a requirement; it is not an exception. Therefore, the exception is deleted and the text has been relocated to Section 605.11.3.2.1.
605.11.3 Exc 2:	This is an exception based on the need for the ability to vertically ventilate smoke through the roof. Section 605.11.3.2.5 (renumbered from 605.11.3.2.4) deals with smoke ventilation. The exception is intended to apply to a specific set of requirements regarding smoke ventilation. If the exception is left in this section, it exempts these systems from all of the requirements in this entire section. Therefore this exception has been relocated to Section 605.11.3.2.5.
605.11.3.2:	The title of this section is revised to correlate with the text of the section. The text only applies to one- and two-family dwellings so the term “residential” is removed from the title.

Also, the section is revised by deleting the reference to 'access' since the subsections deal with more than access, and additional access requirements are found in 605.11.3.1.
605.11.3.2.1: This section originates from 605.11.3 Exception 1. It is relocated to the section which applies to dwellings and is inserted as a requirement.

Additionally, the 2nd sentence is added as a new requirement. The current requirements limit the size of each PV array but provide no guidance as to the required separation between multiple PV arrays. This requirement fills that void by requiring a 3 foot separation between PV arrays. The 3 foot distance is the same spacing requirement found around PV arrays to the edge of roof or to the ridge of the roof, and provides for access around the arrays.

605.11.3.2.2: Renumbered from 605.11.3.2.1. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.
605.11.3.2.3: Renumbered from 605.11.3.2.2. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.
605.11.3.2.4: Renumbered from 605.11.3.2.3. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.
605.11.3.2.5: Renumbered from 605.11.3.2.4. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.

Additionally, the exception is added which was previously located in Section 605.11.3. This exception is based on the need for the ability to vertically ventilate smoke through the roof, and Section 605.11.3.2.5 deals with smoke ventilation.

605.11.3.3: The text is revised to correlate with the previous revisions regarding one- and two-family dwellings.
605.11.3.3.1: This exception is reworded into an actual exception which states that the required clearance is allowed to be reduced to 4', rather than requiring a clearance of 4'.

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

605.11 #2-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The committee agreed with the proponent's reason statement that the proposal is a needed editorial clean-up and minor technical improvement to the PV section that represents a collaborative effort of the fire service and the major subject stakeholders and results in a more logical presentation of the requirements.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through 605.11.3 ~~605.11.4~~, the *International Building Code* and NFPA 70.

605.11.1 ~~**605.11.3**~~ **Access and pathways.** Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.1.1 through 605.11.1.3.3 ~~605.11.3.1 through 605.11.3.3.3~~.

Exceptions:

1. Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures.
2. Roof access, pathways, and spacing requirements need not be provided where the fire chief has determined rooftop operations will not be employed.

__**605.11.1.1**__ ~~**605.11.3.1**~~ **Roof access points.** Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

__**605.11.1.2**__ ~~**605.11.3.2**~~ **Solar photovoltaic systems for Group R-3 buildings.** Solar photovoltaic systems for Group R-3 buildings shall comply with Sections 605.11.3.2.1 through 605.11.3.2.4.

> **Exception:** These requirements shall not apply to structures designed and constructed in accordance with the International Residential Code.

__**605.11.1.2.1**__ ~~**605.11.3.2.1**~~ **Size of solar photovoltaic array.** Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a 3-foot-wide (914 mm) clear access pathway.

__**605.11.1.2.2**__ ~~**605.11.3.2.2**~~ **Hip roof layouts.** Panels and modules installed on __Group R-3 buildings__ ~~one- and two-family dwellings~~ with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a location on the building capable of supporting the live load of fire fighters accessing the roof.

> **Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

__**605.11.1.2.3**__ ~~**605.11.3.2.3**~~ **Single ridge roofs.** Panels and modules installed on __Group R-3 buildings__ ~~one- and two-family dwellings~~ with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels and modules are located.

> **Exception:** This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

__**605.11.1.2.4**__ ~~**605.11.3.2.4**~~ **Roofs with hips and valleys.** Panels and modules installed on __Group R-3 buildings__ ~~one- and two-family dwellings~~ with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels and modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.

> **Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

__**605.11.1.2.5**__ ~~**605.11.3.2.5**~~ **Allowance for smoke ventilation operation.** Panels and modules installed __Group R-3 buildings__ ~~one- and two-family dwellings~~ shall be located no less than 3 feet (914 mm) from the ridge in order to allow for fire department smoke ventilation operations.

> **Exception:** Panels and modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

__**605.11.1.3**__ ~~**605.11.3.3**~~ **Other than ~~one- and two-family dwellings~~ Group R-3 buildings.** Access to systems for __buildings__ ~~occupancies~~ other than __those containing__ Group R-3 __occupancies__ ~~buildings~~ shall be provided in accordance with Sections __605.11.2.3.1__ ~~605.11.3.3.1~~ through __605.11.2.3.3__ ~~605.11.3.3.3~~.

> **Exception:** Where it is determined by the *fire code official* that the roof configuration is similar to that of a Group R-3 occupancy, the residential access and ventilation requirements in Sections __605.11.2.2.1__ ~~605.11.3.2.1~~ through __605.11.2.2.5__ ~~605.11.3.2.4~~ shall be permitted to be used.

__**605.11.1.3.1**__ ~~**605.11.3.3.1**~~ **Access.** There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof.

> **Exception:** Where either axis of the building is 250 feet (76 200 mm) or less, the clear perimeter around the edges of the roof shall be a minimum 4-foot-wide (1290 mm).

__**605.11.1.3.2**__ ~~**605.11.3.3.2**~~ **Pathways.** The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting fire fighters accessing the roof.
2. The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting the live load of fire fighters accessing the roof.
3. Shall be a straight line not less than 4 feet (1290 mm) clear to skylights or ventilation hatches.
4. Shall be a straight line not less than 4 feet (1290 mm) clear to roof standpipes.
5. Shall provide not less than 4 feet (1290 mm) clear around roof access hatch with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.

__**605.11.1.3.3**__ ~~**605.11.3.3.3**~~ **Smoke ventilation.** The solar installation shall be designed to meet the following requirements:

1. Arrays shall be no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.
2. Smoke ventilation options between array sections shall be one of the following:

2.1. A pathway 8 feet (2438 mm) or greater in width.
2.2. A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or gravity operated drop-out smoke and heat vents.
2.3. A 4-foot (1290 mm) or greater in width pathway and bordering all sides of non-gravity-operated drop out smoke and heat vents.
2.4. A 4-foot (1290 mm) or greater in width pathway and bordering 4-foot by 8-foot (1290 mm by 2438 mm) "venting cutouts" every 20 feet (6096 mm) on alternating sides of the pathway.

605.11.2 ~~**605.11.4**~~ **Ground-mounted photovoltaic arrays.** Ground-mounted photovoltaic arrays shall comply with Section~~s~~ 605.11 ~~through 605.11.2~~ and this section. Setback requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground mounted photovoltaic arrays.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Proposals F62-13, F64-13, F69-13, F72-13, F73-13, F74-13 and RM96-13 all made revisions to Section 605.11 requirements for solar photovoltaic power systems. Most of the revisions accepted by the committee worked well together, with a few exceptions that need coordination/clarification.

This public comment to F62-13 shows what Section 605.11 will look like if all of the approved proposals are adopted. The changes included in this proposal accomplish the following:

1. Editorially show the new numbering system that results from F94-13 deleting Sections 905.11.1 through 905.11.2. (Note - ICC staff ultimately decide the numbering system to be used)
2. In new Section 605.11.1, proposal F62-13 removed what is shown as exception 2, but this section was modified by F69-13. This exception was retained.
3. In new Section 605.11.1.2 the exception was added by proposal RM96-13.
4. In new Section 605.11.1.3 both F62-13 and F72-13 (as modified) added wording which resulted in the title of the section reading "Other than one- and two-family dwellings Group R-3 buildings". This title was revised to only include "Group R-3 buildings". In addition the text in this section was editorially revised to clarify that it applies to buildings, other than those containing Group R-3 occupancies. In addition references to "one- and two-family dwellings" was changed to "Group R-3 buildings" in Sections 605.11.1.2.2 , 605.11.1.2.3, 605.11.1.2.4 and 605.11.1.2.5 for consistency.
5. New Section 605.11.2 deleted referenced to previous Section 605.11.2 since this section was deleted by proposal F64-13.

F62-13

Final Action: AS AM AMPC____ D

F76-13
606.5 (New)

Proposed Change as Submitted

Proponent: Mona Casey, United Parents to Restrict Open Access to Refrigerant, representing the United Parents to Restrict Open Access to Refrigerant

Add new text as follows:

606.5 Access port protection. Refrigerant circuit access ports located outdoors shall be fitted with locking-type, tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

> **Exception:** Refrigerant circuit access ports on equipment installed in controlled areas such as on roof tops with locked and alarmed access hatches or doors.

(Renumber subsequent sections.)

Reason: The purpose of this code change proposal is to add language to the code for securing refrigerant access ports, which will help reduce injuries and fatalities resulting from unauthorized access to refrigerant. Refrigerants are controlled substances that must be properly protected. The IMC currently has requirements for protection of refrigerant ports. This will add the requirements to the IFC to be consistent with the IMC. It will also provide the fire official with proper code language to enforce the requirement.

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

Analysis: Proposed Section 606.5 (without the exception) is identical to IMC Section 1101.10.

606.5 (NEW)-F-CASEY.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent's reason statement that the code change provides a safeguard against unauthorized tampering with readily accessible refrigerant ports and also provides correlation with the IMC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Barry Greive, representing Target Corporation, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

606.5 Access port protection. Refrigerant circuit access ports located outdoors shall be fitted with locking-type, tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

> **Exception:** Refrigerant circuit access ports on equipment installed in controlled areas such as on roofs ~~tops~~ with locked ~~and alarmed~~ access hatches or doors.

Commenter's Reason: This change is needed to be consistent with the modification and approval made by the Mechanical Code Committee and the ICC Membership during the Cycle A Mechanical Code Hearings.

There was a lot of discussion regarding refrigeration systems behind locked areas such as enclosures including roofs with hatches. The Mechanical Committee and ICC Membership felt that the areas are already secured and made safe by locking methods and the need for alarming on top of that was not necessary.

The Fire Code and Mechanical Code need to be consistent for uniform enforcement.

Public Comment 2:

Steve Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC, requests Disapproval.

Commenter's Reason: This requirement does not belong in the Fire Code. It is a construction requirement and is already covered in the IMC and IRC. The Fire Code is not a mechanical code. We do not need to duplicate code requirements in all of the codes just to make sure it is covered. The protection is adequately covered in the other codes. Section 606.1 of the Fire Code specifically requires refrigeration systems to be installed in accordance the IMC which already require the caps.

F76-13
Final Action: AS AM AMPC____ D

F80-13
606.12.1 (New), Chapter 80

Proposed Change as Submitted

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

606.12.1 Standards. Refrigeration systems and the buildings in which such systems are installed shall be in accordance with ASHRAE 15.

606.12.1.1 Ammonia Refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with the following standards:

1. IIAR-2 for system design and installation
2. IIAR-6 for maintenance and inspection
3. IIAR-7 for operating procedures
4. IIAR-8 for decommissioning.

Add standards to Chapter 80 as follows:

IIAR

International Institute of Ammonia Refrigeration
1001 N. Fairfax Street, Suite 503
Alexandria, VA 22314

IIAR-2-2014	*Equipment, Design, and Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems*
IIAR-6-2014	*Maintenance and Inspection of Closed-Circuit Ammonia Mechanical Refrigerating Systems*
IIAR-7-2013	*Developing Operating Procedures for Closed-Circuit Ammonia Mechanical Refrigerating*
IIAR-8-2014	*Decommissioning of Closed- Circuit Ammonia Mechanical Refrigerating Systems*

Reason: The International Institute of Ammonia Refrigeration is completing a suite of standards to prescribe regulations for the safe design, installation, operation, maintenance, inspection and decommissioning of ammonia refrigeration systems. All of these documents will be ANSI standards. As the leading organization representing the interests of the ammonia refrigeration industry, IIAR believes that it is essential for facilities with ammonia refrigeration systems to follow the requirements in these standards, which are being written as enforceable documents, as a basis of providing for the safety of the these facilities as well as surrounding communities.

With the exception of IIAR-2, the remaining standards are at various stages of completion with respect to the ANSI process, and it is anticipated that all will be completed prior to conclusion of the 2013 ICC code cycle.

Note that IIAR-2 is already adopted by the IMC, and it is being proposed for adoption by the IFC as well because the standard includes requirements governing refrigerant leak detection alarms and other topics scoped to the IFC.

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

Analysis: A review of the standards proposed for inclusion in the code, IIAR-6, -7 and -8, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. IIAR-2-99 with 2005 addendum is currently referenced in the IMC. An update in the year edition of that standard will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

606.12.1 (NEW)-F-SHAPIRO

Committee Action Hearing Results

For staff analysis of the content of IIAR-2-2014 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: Approved as Modified

Modify the proposal as follows:

606.12.1 Standards. Refrigeration systems and the buildings in which such systems are installed shall be in accordance with ASHRAE 15.

606.12.1.1 Ammonia Refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with ~~the following standards: 1.~~ IIAR-2 for system design and installation.

~~2. IIAR-6 for maintenance and inspection~~
~~3. IIAR-7 for operating procedures~~
~~4. IIAR-8 for decommissioning.~~

Add standards to Chapter 80 as follows:

IIAR

International Institute of Ammonia Refrigeration
1001 N. Fairfax Street, Suite 503
Alexandria, VA 22314

IIAR-2-2014	*Equipment, Design, and Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems*
~~IIAR-6-2014~~	~~*Maintenance and Inspection of Closed-Circuit Ammonia Mechanical Refrigerating Systems*~~
~~IIAR-7-2013~~	~~*Developing Operating Procedures for Closed-Circuit Ammonia Mechanical Refrigerating*~~
~~IIAR-8-2014~~	~~*Decommissioning of Closed- Circuit Ammonia Mechanical Refrigerating Systems*~~

Committee Reason: The committee agreed with the proponent's reason statement that the code change provides an appropriate referenced standard for refrigeration system design and installation. The modification deletes standards that are not yet approved and ready for publication.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing International Institute of Ammonia Refrigeration, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

606.12.1.1 Ammonia Refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with IIAR-2 for system design and installation and IIAR 7 for operating procedures.

Add a standard to Chapter 80 as follows:

IIAR

International Institute of Ammonia Refrigeration
1001 N. Fairfax Street, Suite 503
Alexandria, VA 22314

IIAR-7-2013 *Developing Operating Procedures for Closed-Circuit Ammonia Mechanical Refrigerating*

(Portions of proposal not shown remain unchanged)

Commenter's Reason: At the time of the committee hearing, development of IIAR 7 was slightly behind schedule, and the standard had not yet been finalized. Accordingly, as the proponent of the proposal, we asked the committee to exclude IIAR 7 from consideration at that time. The standard has now completed the ANSI standard development process and has been finalized. A copy is available for download at http://tinyurl.com/IIAR7. IIAR 7 represents a significant step forward in refrigeration safety by establishing a minimum standard for mandatory operating procedures for ammonia refrigeration systems. Referencing this document in the IFC will give code enforcers a means to require that appropriate operating procedures be developed and maintained, which, when followed, will significantly reduce the risk of accidents.

Analysis: The draft of IIAR7-2013 was submitted with code change F80-13 and was reviewed by the IFC committee. For analysis of the content of IIAR7-2013 relative to CP #28, Section 3.6, please visit, http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf.

F80-13

Final Action: AS AM AMPC____ D

F84-13
607.5, 607.5.1, 607.5.2, 607.5.3

Proposed Change as Submitted

Proponent: Brian Black, BDBlack Codes, Inc., representing National Elevator Industry Inc. (bdblack@neii.org)

Revise as follows:

607.5 Standardized fire service elevator keys. Buildings with elevators equipped with Phase I emergency recall, Phase II emergency in-car operation, or a fire service access elevator shall be equipped to operate with a standardized fire service elevator key ~~*approved* by the *fire code official*~~ complying with ASME A17.1/CSA B44.

> ~~**Exception:** The owner shall be permitted to place the building's nonstandardized fire service elevator keys in a key box installed in accordance with Section 506.1.2.~~

~~**607.5.1 Requirements for standardized fire service elevator keys.** Standardized fire service elevator keys shall comply with all of the following:~~

1. ~~All fire service elevator keys within the jurisdiction shall be uniform and specific for the jurisdiction. Keys shall be cut to a uniform key code.~~
2. ~~Fire service elevator keys shall be of a patent-protected design to prevent unauthorized duplication.~~
3. ~~Fire service elevator keys shall be factory restricted by the manufacturer to prevent the unauthorized distribution of key blanks. No uncut key blanks shall be permitted to leave the factory.~~
4. ~~Fire service elevator keys subject to these rules shall be engraved with the words "DO NOT DUPLICATE."~~

~~**607.5.2 Access to standardized fire service keys.** Access to standardized fire service elevator keys shall be restricted to the following:~~

1. ~~Elevator owners or their authorized agents.~~
2. ~~Elevator contractors.~~
3. ~~Elevator inspectors of the jurisdiction.~~
4. ~~*Fire code officials* of the jurisdiction.~~
5. ~~The fire department and other emergency response agencies designated by the *fire code official*.~~

~~**607.5.3 Duplication or distribution of keys.** No person shall duplicate a standardized fire service elevator key or issue, give, or sell a duplicated key unless in accordance with this code.~~

607.5.4 Responsibility to provide keys. The building *owner* shall provide up to three standardized fire service elevator keys where required by the *fire code official*, upon installation of a standardized fire service key switch or switches in the building.

Reason: The National Elevator Industry Inc. (NEII) agrees with the reason this section was added to the 2012 International Fire Code, that firefighters need a standardized fire service elevator key that is secure and that will work throughout a jurisdiction. However, this is already a requirement in the ASME A17.1/CSA B44 Safety Code for Elevators and Escalators referenced by the International Fire Code:

ASME A17.1-2010/CSA B44-10
SECTION 2.27
EMERGENCY OPERATION AND SIGNALING DEVICES

2.27.8 Switch Keys

The key switches required by 2.27.2 through 2.27.5 for all elevators in a building shall be operable by the FEO-K1 key. The keys shall be Group 3 Security (see 8.1). A separate key shall be provided for each switch. These keys shall be kept on the premises in a location readily accessible to firefighters and emergency personnel, but not where they are available to the public. This key shall be of a tubular, 7 pin, style 137 construction and shall have a bitting code of 6143521 starting at the tab sequenced clockwise as viewed from the barrel end of the key. The key shall be coded “FEO-K1.” The possession of the “FEO-K1” key shall be limited to elevator personnel, emergency personnel, elevator equipment manufacturers, and authorized personnel during checking of Firefighters’ Emergency Operation (see 8.1 and 8.6.11.1).

Where provided, a lock box, including its lock and other components, shall conform to the requirements of UL 1037 (see Part 9).

NOTE (2.27.8): Local authorities may specify additional requirements for a uniform keyed lock box and its location to contain the necessary keys.

Group 3 Security is specified in Section 8.1:

8.1.4 Group 3: Emergency Operation

Group 3 covers access or operation of equipment by emergency, authorized, and elevator personnel.

Simply, this requirement is unnecessary because the need it purports to address is already covered by the code’s referenced standard. However, there is a greater problem with having a requirement in the International Fire Code that conflicts with the firefighter key requirements of ASME A17.1/CSA B44.

The proponents of this code provision proposed in the 2012 cycle dismissed the conflict between the IFC and ASME code by claiming that Section 102.7 of the IFC resolves this by stating, “Where differences occur between the provisions of this code and the referenced standards, the provisions of this code apply.” This argument may be true for most codes and standards referenced in the I-Codes, but is incorrect in this case.

In many jurisdictions in the United States (e.g., Wisconsin) the building code, fire code and elevator code are enacted by different pieces of legislation and regulated by entirely different state or municipal rules and agencies. Because of this, one department enforces the fire code, another the elevator code, and neither official is obligated or legally able to recognize the requirements of the other. In other words, Section 102.7 of the IFC does not “trump” the laws and rules that adopt and regulate these jurisdictions’ elevator codes.

The result is that the State Fire Marshall will require one firefighters’ elevator key (the IFC key), the Chief Elevator Inspector will require another (The ASME A17.1 FEO-K1 key), neither will have priority over the other, and the building owner will be continuously in violation of one law or the other.

The other major problem with this new section of the code is that, unlike the demands placed on proponents for most I-Code changes, no evidence was offered to support the need for this change. There was (and is) no evidence that firefighters have been hampered in fighting a building fire because some unauthorized person was using an ASME A17.1 FEO-K1 key at the time. No loss of life or property because some pizza delivery person was able to acquire a firefighter elevator key on the internet (as alleged in the testimony on this code change) and deny elevator use for firefighters or emergency personnel.

Ironically, we found that in Massachusetts the only reported misuses of firefighter keys were by EMTs. EMTs are authorized to be given the special IFC fire key by the existing code text!

A Captain in the Toronto Fire Department who has fought countless high-rise fires in his career dismissed the need for some special fire service elevator key that exceeds the requirements of ASME A17.1/CSA B44 by asking, “What can you do with it? Ride an elevator up and down, up and down until you’re bored or sick?” As dismissive as the Captain’s statement may be, it demonstrates how unnecessary it is for the IFC to create special requirements for keys that conflict with the ASME requirements that have been in place (and referenced by the IFC and IBC) for years. This code section “solves” a problem that does not exist while creating many more for the Fire Marshall, Elevator Inspector, and building owner.

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

607.5-F-BLACK

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee’s disapproval was based on its agreement with testimony that indicated the current text is new to the 2012 edition and is widely approved by the fire service as providing much more specific, secure and comprehensive key criteria than the referenced standard. It was also noted that ASME A17.1 may not be readily available to fire code officials and would thus make enforcement difficult.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Black, BDBlack & Associates, Ltd., representing National Elevator Industry Inc. (NEII), requests Approval as Submitted.

Commenter's Reason: The Committee Reason as stated in the *2013 Report of the Committee Action Hearing Results* does not address the principle reason this proposal was submitted, that being that in scores of state and local jurisdictions in the US there are separate elevator laws that require conformance with the ASME A17.1/CSA B44 firefighter key requirements. Any different requirements adopted through reference to the ICC *International Fire Code* do not trump this legal reality. The Section of the IFC that states,

> ***102.7.1 Conflicts.*** *Where conflicts occur between provisions of this code and referenced codes and standards,the provisions of this code shall apply.*

does not apply where a separate elevator law requires enforcement of the ASME A17.1/CSA B44 code.

The reality is that elevator manufacturers will install equipment with ASME A17.1/CSA B44 FEO-K1 keys to satisfy the initial inspection requirements enforced by the jurisdiction Elevator Inspector, leaving the building owner to battle between the Elevator Inspector and Fire Marshall after the installation is complete.

The statement that *". . . the current text is new to the 2012 edition and is widely approved by the fire service . . . "* is very confusing. The 2012 edition of the code has yet to be widely adopted, so the alleged approval is not apparent. Conversely, almost every state in the US has adopted an edition of the ASME A17.1/CSA B44 code that references use of its specified FEO-K1 firefighter key. The requirements for the FEO-K1 key were developed by the ASME A17 Emergency Operations Committee that included numerous members of the fire service profession.

Whether the IFC firefighter key is more secure than that specified by ASME A17.1/CSA B44 is an interesting supposition that has yet to be proven, but the question remains: What is the safety problem the IFC text is attempting to resolve? Research done by the ASME A17.1/CSA B44 Task Groups on the Use of Elevators in Fires indicates there has not been a significant problem of elevators being unavailable to firefighters because they were "captured" by persons unauthorized to have FEO-K1 keys.

Finally, the committee suggested enforcement could be difficult because the ASME A17.1/CSA B44 code may not be readily available to fire code officials. This is contradicted by the fact that the 2012 edition of the IFC already references ASME A17.1/CSA B44 in Sections 508.1.5 (elevator recall switch), 607.1 (Phase I and Phase II emergency recall) and 907.3.3 (fire detectors installed in accordance with ASME A17.1). Additionally, in many jurisdictions the Elevator Inspector can confirm compliance with the ASME A17.1/CSA B44 code.

F84-13

Final Action: AS AM AMPC____ D

F90-13
609.2

Proposed Change as Submitted

Proponent: Barry Greive, representing Target Corporation (barry.greive@target.com)

Revise as follows:

609.2 Where required. A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease vapors.

> **Exception:** A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with Section 17 of UL 710B

Reason: This proposal is intended to bring consistency between the Fire Code and Mechanical Code provisions.

Section 609.1 of the Fire Code states that "Commercial kitchen exhaust hoods shall comply with the requirements of the International Mechanical Code." This statement lends itself to imply that they should be consistent. There are many situations where the amount of grease is very low to almost non-existent and a type 1 hood is not needed. This exception will bring greater consistency between the codes, better clarity to when a type 1 hood is needed, and a test method that must be followed to show compliance.

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

609.2-F-GRIEVE

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

609.2 Where required. A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease vapors.

> **Exception:** A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with ~~Section 17 of~~ UL 710B.

Committee Reason: The committee agreed with the proponent's reason statement. The modification correlates with the IMC on the subject.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council (IFC), requests Disapproval.

Commenter's Reason: The proposed exception addresses the performance of the equipment, but not the accumulation of grease in the duct. While 5 mg/m^3 is a small quantity, grease will continue to accumulate in the duct over time. Some minimum requirements for construction, inspection and maintenance of the duct need to be added if this exception is to be permitted. The proposal does not identify any of these.

Over the last decade, the technology surrounding the installation and protection of grease ducts has evolved in response to growing concern over grease duct fires, and concerns over space. The protection of grease ducts under fire exposure conditions is an item of importance in securing constructions that are safe, and that are not a menace to adjacent construction or building occupants. Protection of grease ducts has long been addressed in the codes of many authorities, municipal and other agencies. Many types of enclosure materials are used to protect grease ducts. Some provisions for construction and maintenance of these non-Type 1 hoods needs to be included.

F90-13

Final Action: AS AM AMPC____ D

F91-13
609.3.3.2, Chapter 80

<u>Proposed Change as Submitted</u>

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

609.3.3.2 Grease accumulation. If during the inspection it is found that hoods, grease-removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned <u>in accordance with ANSI/IKECA C-10</u>.

Add new standard to Chapter 80 as follows:

IKECA

International Kitchen Exhaust Cleaning Association
100 North 20th, Street, Suite 400
Philadelphia, PA 19103

C10-2011 *Standard for Cleaning of Commercial Kitchen Exhaust Systems…* 609.3.3.2

Reason: Commercial kitchen exhaust systems remove smoke, soot and grease-laden vapor resulting from cooking operations. These systems become contaminated with grease and cooking by-products over time. Accumulations of these combustible contaminants create a fire safety hazard to workers, patrons, other building occupants and property. Mitigation of this hazard requires periodic cleaning of commercial kitchen exhaust systems.

The first edition of ANSI/IKECA C10-2011, *Standard for Cleaning of Commercial Kitchen Exhaust Systems*, was developed by the IKECA Standards Development Committee Consensus Body. It approved the standard on September 1, 2011. It was approved as an American National Standard by the American National Standards Institute (ANSI) on December 9, 2011.

For many years, the commercial kitchen exhaust cleaning industry has relied on certain codes and standards. ANSI/IKECA C10 addresses many of the areas that these other standards and codes do not cover. The other codes include the *International Fire Code*® (Section 609 Commercial Kitchen Hoods; 904 Alternative Automatic Fire-Extinguishing Systems, including: 904.2.1 Hood suppression systems; 904.3.2 Actuation; 904.3.3 System interlocking; 904.3.5 Monitoring; 904.11 Commercial cooking systems; 904.11 thru 904.11.6.5), the *International Mechanical Code*® (Section 202 General Definitions; 506 Commercial Kitchen Grease Ducts and Exhaust Equipment; 507 Commercial Kitchen Hoods; 508 Commercial Kitchen Make Up Air; 509 Fire Suppression Systems; 917 (Solid Fuel) Cooking Appliances), the A*SHRAE® Handbook HVAC Applications* (Chapter 31, Ventilation of the Industrial Environment), and the *NFPA 96®, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*.

ANSI/IKECA C-10 is intended to determine the frequency and necessity for commercial kitchen exhaust system cleaning through inspection procedures, to define acceptable methods for cleaning exhaust systems and components, and to set standards for acceptable post-cleaning cleanliness.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This standard applies to, but is not limited to, Type I exhaust systems. This standard does not apply to residential kitchen exhaust systems, replacement air systems, fire extinguishing systems, heating and air-conditioning systems, dryer exhaust systems, and toilet exhaust systems.

The purpose of this standard is to enhance public safety by reducing the potential fire safety hazards associated with commercial kitchen exhaust systems through the performance of professional cleaning services, irrespective of the type of cooking equipment used and whether used in public or private facilities.

About IKECA: The International Kitchen Exhaust Cleaning Association (IKECA) formed in 1989 and became an ANSI accredited standards developer in 2008. IKECA was founded by a small group of exhaust kitchen exhaust cleaning specialists who were attending the same meeting. They had similar beliefs in the importance of proper and complete exhaust cleaning to the fire protection world. Within two years, these founders had created the first non-profit trade association for the kitchen exhaust cleaning industry.

Today, IKECA members represent some of the best in the industry from around the world. They are proud to have made significant contributions to the decrease in commercial kitchen fires in the U.S. The current membership is approximately 250. Headquartered in Philadelphia, IKECA is a member of the International Code Council. For more information, visit www.ikeca.org.

Additionally this Standard covers the required documentation associated with the cleaning and inspections of kitchen exhaust hoods. Currently there is no Standard recognized by the IFC for this purpose, and adoption of this Standard will enhance code compliance and enforcement.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

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

Analysis: A review of the standard proposed for inclusion in the code, IKECA C10-2011, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

609.3.3.2-F-ZUBIA-FCAC

Committee Action Hearing Results

For staff analysis of the content of IKECA C10-2011 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: Approved as Submitted

Committee Reason: The committee agreed with the proponent's reason statement that the code change provides a needed standard to assist the fire code official in determining standards of and methods for cleaning hood and duct systems.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Glenn A. Dean, Virginia State Fire Marshal's Office, requests Disapproval.

Commenter's Reason: The ICC Fire Code Committee approved F91 "as submitted" on a 14-0 vote. The committee reason for accepting F91 was, *"The committee agreed with the proponent's reason statement that the code change provides a needed standard to assist the fire code official in determining standards of and methods for cleaning hood and duct systems."* I too, agree that a standard for determining the need for cleaning is needed, but the adoption of F91 and the referenced ANSI/IKECA C10-2011 standard in its present form may not be it.

It's not an uncommon occurrence to adopt a change early in Virginia and F91 was a candidate for such early adoption until subsequent research revealed the following with items 3, 4 and 5 being the most substantial points:

1. The entire standard published by the International Kitchen Exhaust Cleaning Association (IKECA) is comprised of 31 pages including the covers, Table of Content, index, forward, list of committee members, proposal form, etc., leaving 20 pages for *the meat of the standard*. Of those 20 pages, 10 pages are definitions. That leaves 10 pages of *technical stuff*.
2. Of the 10 pages of technical stuff, there are 8 chapters. Chapter 4 is "pre-Cleaning Operations Inspection"; Chapter 5 is "Energy Source Protection"; Chapter 6 "Protection of Workspace Areas; Chapter 7 "By-Product Control Process Preparation"; Chapter 8 "Process Personnel Protection"; Chapter 9 "Cleaning Processes and Controls" (as I see it, the crux of the standard); Chapter 10 "Exhaust Duct Access and Labeling; and Chapter 11 "Exhaust Cleaning Process Reporting".
3. In these 10 pages of technical stuff, the word "should" appears 8 times. According to ANSI/IKECA C10, Chapter 2, the definition of "should" means, "Indicates a recommendation or that which is advised but not required." I believe the use of this type of advisory language is contrary to the normal practice of the I-Codes to say something "may" or "shall" be done.
4. Aside from the standard's definition of "certified", the body of the standard makes reference to using only certified personnel to perform certain duties 5 times. My question is, certified by whom? IKECA does have a certification program and information on that can be found at http://www.ikeca.org/certification/types. Beyond this, I know of no other certification program. So for me, it raises the question of whether or not this standard and its adoption would be self-serving to IKECA.

5. The depiction of a “depth gauge comb” is contained in the standard. The section that references that depiction states a determination for cleaning is made by scraping the comb along the duct surface. My initial reaction was very supportive because initially I viewed such gauge as less subjective to making a determination. Since then my view has changed. I suppose with a duct surface that appears to be clean enough, if I drag the comb far enough or repeatedly enough, if I were to find a single square inch of sufficient depth in a duct system composed of 50 square feet, by example, I can present the need for cleaning the system to the owner. I think a more definitive method needs to be employed such as limiting a single scrap to a distance of 1-inch, or a foot, or whatever is appropriate. Leaving the language as it is may allow some unscrupulous character to take advantage of a situation or system owner.

The F91 proposed change says that system “components shall be cleaned in accordance with ANSI/IKECA C-10” with the operative word being “cleaned”. If confined to that and that only, and not when cleaning is to be performed, then Chapter 9 of the standard lists the methods of cleaning. My question then becomes, what is different between that and what’s normally done? By referencing the standard, does this become a substantial benefit to adopt the standard? If the reference to the standard is for the method of cleaning only, then the change and commentary needs to strongly and clearly indicate that.

As an individual, I supported this change thinking it would assist in an important area. I thought a less subjective method of determining when a hood and duct systems needs to be cleaned or its level of cleanliness would be of benefit to all involved, but upon looking at this standard and finding the above, I submit it needs to overcome the defects of its self-serving possibility as it relates to certification, strengthening how the depth gauge comb is to used to determine the need for cleaning, and getting rid of the advisory language, all of which forms the basis for this request disapprove the change.

F91-13

Final Action: AS AM AMPC____ D

F95-13

610.1, 610.2, 610.3 (New), 610.4, 610.5, 610.6 (New), 610.7, 5701.2, Chapter 80

Proposed Change as Submitted

Proponent: Andy Burke, Restaurant Technologies, Inc, representing self (aburke@rti-inc.com)

Revise as follows:

610.1 ~~General~~ Commercial Kitchen Cooking Oil Storage Tank Systems. Storage of cooking oil (grease) in commercial cooking operations utilizing aboveground tanks with a capacity greater than 60 gal (227 L) installed within a building shall comply with ~~Chapter 57~~ Sections 610.2 through 610.7. ~~Systems used to store cooking oils in larger than 60-gallon (227 L) above-ground tanks shall also comply with Sections 610.2 through 610.5~~. For purposes of this section, cooking oil shall be classified as a Class IIIB liquid unless otherwise determined by testing.

610.2 Metallic Storage Tanks. Metallic **c**ooking oil storage tanks shall be listed in accordance with UL 142 or UL 80, and shall be installed in accordance with ~~Section 5704 and~~ the tank manufacturer's instructions.

610.3 Nonmetallic Storage Tanks. Nonmetallic cooking oil storage tanks shall be installed in accordance with the tank manufacturer's instructions and shall also comply with all of the following:

1. Tanks shall be designed in accordance with ASTM D1998 unless otherwise approved.
2. Tank capacity shall not exceed 200 gallons per tank.
3. Tanks shall be suitable for use with cooking oil and the maximum temperature to which the tank will be exposed during use.

~~610.3~~ 610.4 ~~Other Storage Components~~ Cooking Oil Storage System Components. Cooking oil storage system components ~~including~~ shall include but are not limited to piping, connections, fittings, valves, tubing, hose, pumps, vents, and other related components used for the transfer of cooking oil ~~from the cooking appliance to the storage tank, and from the storage tank to the discharge point, shall be installed in accordance with Section 5703.6~~ and are permitted to be of either metallic or non-metallic construction.

610.4.1 Design Standards. The design, fabrication, and assembly of system components shall be suitable for the working pressures and structural stresses to be encountered by the components.

610.4.2 Components in Contact with Heated Oil. Any system component that comes in contact with heated cooking oil shall be rated for the maximum intermittent and continuous operating temperatures expected in the system.

610.4.3 Plenums. Installation of non-metallic cooking oil system components shall be prohibited in concealed interstitial spaces used as return air plenums unless the components are fully enclosed within continuous noncombustible raceways or enclosures, approved gypsum board assemblies, or within materials listed and labeled for installation within a plenum.

~~610.4~~ 610.5 Tank Venting. Normal and emergency venting shall be provided for cooking oil storage tanks ~~shall terminate outside the building as specified in Sections 5704.2.7.3 and 5704.2.7.4~~.

610.5.1 Normal Vents. Normal venting shall be located above the maximum normal liquid line, and shall have a minimum effective area at least as large as the largest filling or withdrawal connection.

610.5.2 Emergency Vents. Emergency relief venting shall be located above the maximum normal liquid line, and shall be in the form of a device or devices that will relieve excessive internal pressure caused by an exposure fire. For non-metallic tanks, the emergency relief vent shall be allowed to be in the form of construction.

610.6 Heating of Cooking Oil. Electrical equipment used for heating cooking oil in cooking oil storage systems shall be listed to UL 499 and shall comply with NFPA 70. Use of electrical immersion heaters shall be prohibited in non-metallic tanks.

~~610.5~~ 610.7 Electrical Equipment. Electrical equipment used for the operation ~~and heating~~ of ~~the~~ cooking oil storage systems shall ~~be listed and~~ comply with NFPA 70.

Revise as follows:

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1 through 10 *(No change to current text)*

11. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 610.

Add new standards to Chapter 80 as follows:

ASTM

D 1998-06 Standard Specification for Polyethylene Upright Storage Tanks

UL

499-05 Standard for Electrical Heating Appliances

Reason: The section as written presents practical challenges to innovative restaurant technologies, which entirely eliminate manual handling of cooking oil. These systems provide personnel safety and environmental improvements to existing manual or semi-manual oil handling operations. The proposal seeks to address the following issues:

The requirements as currently written (added in 2012 version of the code) are based on used, spent, or inedible cooking oil. For systems which include fresh cooking oil supply, a foodstuff, tanks and components must be food grade. The metallic tank standards currently referenced are based on fuel oil storage tanks and do not meet food grade requirements. The proposal addresses this limitation by adding requirements for non-metallic tanks, with an associated recognized engineering tank standard adapted for use with cooking oil.

Current references to Chapter 57 are more relevant to industrial flammable and combustible liquid tank requirements. High flash point cooking oil in a restaurant back-of-house setting represents a different, and generally lower, hazard than commonly anticipated by Chapter 57. The proposed exemption to Section 5701.2 unifies all pertinent fire safety requirements into Section 610 and the standards referenced therein. This establishes the level of safety applicable to this hazard. This approach is consistent with other exceptions in Chapter 57, in particular the exception for fuel oil tanks connected with oil burning equipment. The proposal takes into consideration comments received from code officials and fire safety professionals.

Note: This proposal applies only to the storage of cooking oil, a Class IIIB liquid with a high flash point (typically above 500°F), which represents a low fire hazard when stored and used per the requirements of the proposal. All other flammable and combustible liquids must comply with Chapter 57.

As written, Section 610.4 requires tank venting to terminate outside of the building, as specified in Sections 5704.2.7.3 and 5704.2.7.4. These referenced sections allow tanks storing Class IIIB liquids to vent inside the building, based on the relatively low fire hazard associated with Class IIIB liquids. The proposal modifies the current requirements for venting to accurately reflect the level of protection for this hazard as established in Chapter 57.

The intent of the requirements as written, as described in the 2012 substantiation, was to add a level of protection to address the use of immersion heaters in storage tanks containing used cooking oil. The proposal addresses these concerns by requiring compliance to UL 499 and NFPA 70, and by restricting the use of immersion heaters to metallic tanks only. Furthermore, the proposal requires all other electrical equipment used with cooking oil storage tank systems to comply with NFPA 70 as well.

The limitations for installing non-metallic tubing or piping are consistent with the International Mechanical Code requirements.

Cost Impact: The code change proposal will not increase the cost of construction. The introduction of Section 610 to the 2012 IFC increased cost of construction by limiting cooking oil storage tanks to metallic construction. The proposal will allow for non-metallic tank construction, allowing costs to remain reasonable for this type of technology and usage. The proposal also provides cost efficiencies for support/compliance of environmental initiatives to limit/prevent the introduction of used cooking oil and used portable containers into liquid and solid waste streams.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D1998-06, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. UL 499-05 is currently referenced in the IMC.

610.1-F-BUR

Committee Action Hearing Results

For staff analysis of the content of ASTM D1998-06 and UL 499-05 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: Disapproved

Committee Reason: The committee's disapproval was based on its agreement with testimony that indicated that the proposed standard ASTM D1998 is scoped to apply only to tanks with a capacity greater than 500 gallons, that the tank testing that has been done to ASTM D1998 so far does not speak to tank material degradation over time or to the storage of liquids with a temperature over 140-150 degrees F which are the limits of the standard. Concern was also expressed that the fire code official would be put in a position to approve the suitability of tanks and their materials without adequate technical information. The committee also felt that it was unacceptable to run piping in overhead return air plenums under any circumstances, to allow non-metallic relief valves for non-metallic tanks and was concerned as to where the normal and emergency tanks vents would discharge. The concept of the proposal was felt to be a good one but that more appropriate standard development and testing need to be done first.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Andy Burke, Restaurant Technologies, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

610.1 Commercial Kitchen Cooking Oil Storage Tank Systems. Storage of cooking oil (grease) in commercial cooking operations utilizing aboveground tanks installed within a building to store cooking oils with a capacity greater than 60 gal (227 L) shall comply with Sections 610.2 through 610.7, and NFPA 30. For purposes of this section, cooking oil shall be classified as a Class IIIB liquid unless otherwise determined by testing.

610.2 Metallic Storage Tanks. Metallic cooking oil storage tanks shall be listed in accordance with UL 142 or UL 80, and shall be installed in accordance with the tank manufacturer's instructions.

610.3 Nonmetallic Storage Tanks. Nonmetallic cooking oil storage tanks shall be installed in accordance with the tank manufacturer's instructions and shall also comply with all of the following:

1. Tanks shall be ~~designed in accordance with ASTM D1998 unless otherwise approved.~~ listed for use with cooking oil, including the maximum temperature to which the tank will be exposed during use.
2. Tank capacity shall not exceed 200 gallons per tank.
3. ~~Tanks shall be suitable for use with cooking oil and the maximum temperature to which the tank will be exposed during use.~~

610.4 Cooking Oil Storage System Components. Cooking oil storage system components shall include but are not limited to piping, connections, fittings, valves, tubing, hose, pumps, vents, and other related components used for the transfer of cooking oil and are permitted to be of either metallic or non-metallic construction.

610.4.1 Design Standards. The design, fabrication, and assembly of system components shall be suitable for the working pressures, temperatures and structural stresses to be encountered by the components.

610.4.2 Components in Contact with Heated Oil. Any system component that comes in contact with heated cooking oil shall be rated for the maximum ~~intermittent and continuous~~ operating temperatures expected in the system.

~~**610.4.3 Plenums.** Installation of non-metallic cooking oil system components shall be prohibited in concealed interstitial spaces used as return air plenums unless the components are fully enclosed within continuous noncombustible raceways or enclosures, approved gypsum board assemblies, or within materials listed and labeled for such application.~~

610.5 Tank Venting. Normal and emergency venting shall be provided for cooking oil storage tanks.

610.5.1 Normal Vents. Normal ~~venting~~ vents shall be located above the maximum normal liquid line, and shall have a minimum effective area at least as large as the largest filling or withdrawal connection. Normal vents shall be permitted to vent inside the building.

610.5.2 Emergency Vents. Emergency relief ~~venting~~ vents shall be located above the maximum normal liquid line, and shall be in the form of a device or devices that will relieve excessive internal pressure caused by an exposure fire. For non-metallic tanks, the emergency relief vent shall be allowed to be in the form of construction. Emergency vents shall be permitted to vent inside the building.

610.6 Heating of Cooking Oil. Electrical equipment used for heating cooking oil in cooking oil storage systems shall be listed to UL 499 and shall comply with NFPA 70. Use of electrical immersion heaters shall be prohibited in non-metallic tanks.

610.7 Electrical Equipment. Electrical equipment used for the operation of cooking oil storage systems shall comply with NFPA 70.

Revise as follows:

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

11. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 610 and NFPA 30.

Revise Chapter 80 standards as follows:

ASTM
~~D 1998-06 Standard Specification for Polyethylene Upright Storage Tanks~~

UL
499-05 Standard for Electrical Heating Appliances

Commenter's Reason: To speak to the IFC Committee's reasons for disapproval of this code change, an item-by-item discussion follows:

610.1, 610.3, 5701.2(11) and Chapter 80 reference: The IFC Committee expressed concerns about the scope of the referenced standard, ASTM D1998, as applies to non-metallic cooking oil storage tanks, specifically the capacity of the tanks, tank material degradation over time, and the storage of cooking oil at elevated temperatures. The Committee also expressed concern that the fire code official would be put in a position to approve tanks and their materials without adequate technical information. Based on these concerns, and with further discussions and recommendations from the fire code community, the Fire-CAC and NFPA 30, it is proposed to delete the ASTM standard referenced in 610.3 and Chapter 80 and replace with the requirement that non-metallic tanks must be listed for use with cooking oil.

610.4.1: Add temperature requirements to the design standards to address storage at elevated temperatures.

610.4.2: Eliminate the words "intermittent and continuous" to clarify that components shall be rated for the maximum exposure temperature.

610.4.3: To address the IFC Committee concerns about piping in overhead return air plenums, this paragraph will be removed.

610.5.1 and 610.5.2: The IFC Committee expressed concern as to where the normal and emergency vents would discharge. The proposal is to allow the tanks to vent to the inside of the building, understanding that the fire and health safety risk would be very low considering this would apply only to tanks storing cooking oil, a Class IIIB liquid with a high flash point, and also considering the low frequency, volume and speed with which transfer operations occur.

The IFC Committee expressed concerns about non-metallic relief valves for non-metallic tanks. For metallic tanks, venting requirements are contained in the tank standards referenced in 610.2 and no changes to these requirements are proposed. For non-metallic tanks, the vent devices will be included as part of the overall listing. Furthermore, the proposal to add the NFPA 30, Chapter 19 requirement includes venting requirements in accordance with NFPA 30, Chapter 22.

F95-13

Final Action: AS AM AMPC____ D

F98-13
703

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Revise as follows:

SECTION 703
~~FIRE-RESISTANCE-RATED CONSTRUCTION~~ INSPECTION AND MAINTENANCE OF CONSTRUCTION FEATURES

703.1 ~~Maintenance~~ General. ~~The required fire-resistance rating of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems)~~ Construction features intended to limit the spread of fire or smoke shall be maintained.

703.2 Inspection and Maintenance. Construction features intended to limit the spread of fire or smoke ~~Such elements~~ shall be visually inspected by the owner annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated.

> **Exception:** Where construction features are concealed, ~~such elements shall not be required to be visually inspected~~ visual inspection by the owner is not required unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.

703.2.1 Openings. Openings made ~~therein~~ in smoke-resistant or fire-resistance-rated assemblies for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with approved methods or self- or automatic-closing opening protectives capable of resisting the passage of smoke ~~and~~ or fire, as required to maintain the rating of the assembly. ~~Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly.~~

~~**703.1.1 Fireblocking and draftstopping.** Required fireblocking and draftstopping in combustible concealed spaces shall be maintained to provide continuity and integrity of the construction.~~

~~703.1.2~~ 703.2.1.1 ~~Smoke~~ Openings in smoke barriers and smoke partitions. ~~Required smoke barriers and smoke partitions shall be maintained to prevent the passage of smoke. All openings~~ Openings protected with ~~approved~~ smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.

~~**703.1.3 Fire walls, fire barriers and fire partitions.** Required fire walls, fire barriers and fire partitions shall be maintained to prevent the passage of fire. All openings protected with *approved* doors or fire dampers shall be maintained in accordance with NFPA 80.~~

~~703.2~~ 703.2.1.2 Opening protectives in fire-resistance rated assemblies. *(No change to current text)*

~~703.2.1~~ 703.2.1.2.1 Signs. *(No change to current text)*

~~703.2.2~~ 703.2.1.2.2 Hold-open devices and closers. *(No change to current text)*

~~703.2.3~~ 703.2.1.2.3 Door operation. *(No change to current text)*

703.3 Ceilings. *(No change to current text)*

703.4 Testing. *(No change to current text)*

Reason: Chapter 7 and Section 703.1 have been expanded to clearly require that construction features intended to limit the spread of smoke must also be maintained.

Predominantly an editorial code change proposal to clarify the intent of the provisions.

Section 703.1 has been revised to provide a broadly-inclusive requirement to maintain any construction feature that was provided to limit the spread of smoke and/or fire. The parenthetical list in this section has been deleted since it was not all-inclusive. These changes improve the usability of the code and address topics that were previously overlooked, such as maintenance of draft stopping in attics.

The existing text in Section 703.1.1 and the first sentence of Sections 703.1.2 and 703.1.3 have been deleted because they are no longer necessary with the revised text of Section 703.1, which will now encompass fire blocking, draftstopping, smoke barriers, smoke partitions, firewalls, fire barriers and fire partitions.

The second sentence of Section 703.1.3 has been deleted because it is redundant. Section 703.2.1 covers maintenance of opening protectives.

NOTE: To assist in following the revisions proposed in this code change, below is a clean version of section 703 without underline and strikeout.

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

703-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal was disapproved as it appeared to delete important maintenance requirements for fire resistance such as "coatings and sprayed fire resistance." It was noted that this chapter is in need of revision but this proposal appears to be deleting important provisions. It was stressed that Chapter 7 plays a key role in the IFC and provides for the long term performance of a building during a fire.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION 703
~~FIRE-RESISTANCE-RATED~~ INSPECTION AND MAINTENANCE OF CONSTRUCTION

703.1 General. ~~Maintenance.~~ The integrity and any required rating of construction features intended to provide fire-resistance protection to structural elements or to limit the spread of fire or smoke shall be maintained. ~~The required *fire-resistance rating* of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, *smoke barriers*, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems) shall be maintained.~~

703.1.1 Inspection and repair. Construction features intended to provide fire-resistance protection to structural elements or to limit the spread of fire or smoke ~~Such elements~~ shall be visually inspected by the *owner* annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.

703.1.2 Penetrations. Penetrations ~~Openings~~ made in fire and smoke-resistant construction ~~therein~~ for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with *approved* methods capable of resisting the passage of smoke and fire. ~~Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of *approved* construction meeting the fire protection requirements for the assembly.~~

<u>703.1.3</u> **~~703.1.1~~** **Fireblocking and draftstopping.** Required <u>continuity and integrity of</u> *fireblocking* and draftstopping in combustible concealed spaces shall be maintained. ~~to provide continuity and integrity of the construction.~~

<u>703.1.4</u> **~~703.1.2~~** **Smoke barriers and smoke partitions.** Required *smoke barriers* and smoke partitions shall be maintained<u>.</u> ~~to prevent the passage of smoke. All o~~ <u>O</u>penings protected with *approved* smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.

<u>703.1.5</u> **~~703.1.3~~** **Fire walls, fire barriers and fire partitions.** Required *fire walls*, *fire barriers* and *fire partitions* shall be maintained<u>.</u> ~~to prevent the passage of fire. All~~ <u>openings</u> ~~protected with *approved* doors or fire dampers~~ <u>Openings shall be protected by approved methods meeting the fire rating requirements for the assembly and</u> shall be maintained in accordance with NFPA 80.

(Portions of code change not shown remain unchanged)

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This section has been revised to clarify the requirements for inspecting and maintaining fire and smoke-protection construction. The changes accomplish the following:

1. The revised title of Section 703 clarifies that this section covers inspection and maintenance of fire and smoke protection construction. Proposal F97 changed the title of Chapter 7 to FIRE AND SMOKE PROTECTION FEATURES, so it should not be necessary to repeat "fire and smoke protection" in this section title, since it will appear on the same page as the chapter title.
2. Existing section 703.1 was really long and covered many different areas. This section has been broken into three sections; 703.1, 703.1.1 and 703.1.2, and titles were inserted to reflect what is covered in each section.
3. A new charging statement was added to 703.1to clarify that this section covers construction features intended to provide fire-resistance protection to structural elements or to limit the spread of fire or smoke, not just fire resistance ratings. Also, a laundry list of construction types was deleted that served no real purpose.
4. The title "Inspection and repair" was added to new Section 703.1.1, and clarification that the section covered construction features intended to provide fire-resistance protection to structural elements or to limit the spread of fire or smoke (same as 703.1).
5. The existing code requirements moved to new Section 703.1.2 starts with "Openings made therein for the passage of pipes, electrical conduit, wires", etc. To be consistent with terminology used in the current IBC the terms "openings" were changed to "penetrations". The requirements at the end of this section covering openings protected by doors were removed from this section, and are now covered in Sections 703.1.4 and 703.1.5.
6. Editorial changes were made to Section 703.1.3, 703.1.4 and 703.1.5, and new language was added to 703.1.5 to cover opening protection.

Finally, the revisions suggested in this public comment are consistent with the action taken on F97.

F98-13

Final Action: AS AM AMPC____ D

F105-13
806.2

Proposed Change as Submitted

Proponent: Amy Carpenter, AIA, Pioneer Network Long Term Care Code Task Force

Revise as follows:

806.2 Artificial vegetation. Artificial decorative vegetation shall ~~meet the flame propagation performance criteria of NFPA 701. Meeting the flame propagation performance criteria of NFPA 701 shall be documented and certified by the manufacturer in an *approved* manner. Alternatively, the artificial decorative vegetation item shall~~ be tested in accordance ith NFPA 289, using the 20 kW ignition source, and shall have a maximum heat release rate of 100 kW.

> **Exception:** In Groups R-2, I-1 and I-2, artificial vegetation shall be permitted in limited quantities such that a hazard of fire development or spread is not present.

Reason: The text stricken from section 806.2 is proposed because it is not a correct reference and should not be included. NFPA 701 is the standard for "flame propagation of Textiles and Films". The scope description, in the standard, is clear that it is for materials that will be used as curtains, drapes and window treatments, therefore it is not the correct reference standard, nor the correct test method, for artificial decorative vegetation that may be used in buildings.

In Groups R-2, I-1 and I-2 Condition 1, residents often seek to create a home-like environment and display decorative items, like a seasonal wreath at their unit entries. It is not always possible, or practical to determine compliance with NFPA 289, especially for items procured by individual residents. The language of this exception is similar to the permissions for decorative materials, in these use groups, under Section 807. Further, as all of these Occupancies are required to have sprinkler coverage, there is a reduced risk for detrimental effects of limited quantities of artificial vegetation.

Cost Impact: No cost impact

806.2-F-CARPENTER

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee felt that NFPA 289 was a more appropriate test for artificial vegetation. There was some concern with the language found in the exception but it was noted that such language is existing language found in other sections of 806.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, (GBH International), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

806.2 Artificial vegetation. Artificial decorative vegetation shall be tested in accordance with NFPA 289, using the 20 kW ignition source, and shall have a maximum heat release rate of 100 kW.

> ~~**Exception:** In Groups R-2, I-1 and I-2, artificial vegetation shall be permitted in limited quantities such that a hazard of fire development or spread is not present.~~

Commenter's Reason: This comment proposes to eliminate the exception from the proposal because it would allow the introduction of materials that can bring a severe fire problem. It would be difficult for a fire code official to assess properly what is a "limited quantity of artificial vegetation" that does not introduce a hazard of fire development or spread without a fire test. If a fire test has been conducted and the results are satisfactory, then the exception is unnecessary and if a fire test has been conducted and the results are unsatisfactory the exception becomes moot because the artificial vegetation would clearly introduce a significant fire hazard.

The intent of the submitter is clear: to allow an occasional seasonal wreath at the unit entry. However, it is also clear that some artificial Christmas trees that are used during the holiday season can introduce a very large amount of heat release when they burn. NIST tests in 1999 have shown that the heat release rate from a single natural Christmas tree can be as high as 5 MW. More recently, tests with some artificial Christmas trees have shown that even higher levels of heat release will result, particularly when the trees are constructed of polyolefin materials.

The fact that the change introduced by the proposal requires that the fire testing be done in accordance with a much better (albeit more severe and more expensive) fire test makes the probability of finding test results for decorative vegetation more unlikely and would lead to more fire code officials being required to make determinations of fire hazard with little or no basis.

If the code is silent, the fire code official in fact always has the leeway of allowing what the submitter wishes with a much lower probability of inadvertently introducing a severe fire problem.

F105-13

Final Action: AS AM AMPC____ D

F108-13
806.3

<u>Proposed Change as Submitted</u>

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com)

Revise as follows:

806.3 Obstruction of means of egress. The required width of any portion of a *means of egress* shall not be obstructed by decorative vegetation. <u>Natural cut trees shall not be located within an exit, corridor, or a lobby or vestibule.</u>

Reason: Section 806.3 "Obstruction of the means of egress" is recommended for modification because the rapid manner in which a natural cut tree is consumed by fire with the associated release of heat and smoke would present a distinct hazard to egress regardless of whether it impinged on the required width of the means of egress. A burning tree could not be approached or passed by thus effectively blocking that portion of an egress path while spreading heat and smoke to additional portions of the means of egress. A significant impact would be a natural cut tree located within a lobby that has the allowed 50% of all egress capacity passing through the same lobby.

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

806.3-F-DAVIDSON

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Submitted**

Committee Reason: This proposal was approved as it simply prohibits natural cut trees within specific critical areas of the means of egress.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dave Frable, representing U.S. General Services Administration, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

806.3 Obstruction of means of egress. The required width of any portion of a *means of egress* shall not be obstructed by decorative vegetation. Natural cut trees shall not be located within an exit, corridor, or a lobby or vestibule.

<u>**Exception:** Where *approved*, natural cut trees can be placed in the building lobby where all the following condition are met:</u>

<u>1. The building is protected throughout by an automatic sprinkler system designed and installed in accordance with Section 903.3.1.1 or 903.3.1.2 as applicable.</u>
<u>2. The tree is located in the lobby for not more than 2 weeks,</u>
<u>3. The tree stands in a support device capable of containing a minimum two-day supply of water,</u>
<u>4. The water level in the tree support device is maintained at least 2 inches above the tree trunk and checked at least once daily,</u>
<u>5. The position of the tree is clear of exit routes by a distance equal to the height of the tree plus 6 feet,</u>
<u>6. There are no other combustibles likely to be ignited by a fire in the tree within 3 feet of the outer edges of the tree,</u>
<u>7. The maximum height of the tree does not exceed two/thirds of the ceiling height and,</u>
<u>8. The tree is sprayed with an approved non-toxic flame retardant coating.</u>

Commenter's Reason: The intent of this proposed revision is to permit the fire code official flexibility when enforcing the requirements for the placement of natural cut trees during the holiday season in buildings having large lobbies.

Although the number of natural cut tree fires is low, the proponent is correct that these fires carry a higher level of hazard than other fires that occur in a structure. A NIST study in residential structures, supported by the U. S. Fire Administration, evaluated the following three objectives: 1) characterize the heat release rate of dry Fraser fir trees 2) demonstrate the ignition resistance of a tree with a high moisture content and 3) examine the impact of a residential sprinkler on the heat release rate of a dry tree that is on fire in a compartment.

The heat release rates of the trees which were allowed to dry ranged from 3.2 MW to 4.3 MW. The study found that trees that were kept in water, so that the needles maintained a moisture content in excess of 100 %, self-extinguished after being exposed to a flaming book of matches.

The data from the furnished sprinklered room experiment demonstrated that even under conditions of extreme fire growth, a single sprinkler was able to prevent flashover and limit the spread of fire to other objects. The peak heat release rate, from the sprinklered room, was limited to approximately 1.8 MW. The furnished non-sprinklered room experiment generated a post-flashover heat release rate in excess of 6 MW.

Based on the information from the NIST study and the additional requirements in the proposed exception we believe a reasonable degree of safety can be maintain for permitting on a temporary basis natural cut trees in buildings with large lobbies.

F108-13

Final Action: AS AM AMPC____ D

F109-13
807 (IBC [F] 806)

<u>Proposed Change as Submitted</u>

Proponent: Amy Carpenter, representing Pioneer Network Long Term Care Code Task Force (acarpenter@lenhardtrodgers.net) and Wayne Jewell Township of Green Oak, MI representing self

Revise as follows:

SECTION 807
DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

<u>**807.1 (IBC [F]806.1) General**. Combustible</u> <u>decorative materials, other than decorative vegetation, shall comply with Section 807.2 through 807.5.</u>

~~**807.1 (IBC [F]806.1) General requirements**. In occupancies in Groups A, E, I and R-1 and dormitories in Group R-2, curtains draperies, hangings and other *decorative materials* suspended from walls or ceilings shall meet the flame propagation performance criteria of NFPA 701 in accordance with section 807.2 or be noncombustible.~~

~~**Exceptions:**~~

1. ~~Curtains, draperies, hangings and other decorative materials suspended from walls of *sleeping units* and *dwelling units* in dormitories in Group R-2 protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1 and such materials are limited to not more than 50 percent of the aggregate area of walls.~~ *(relocated to Section 807.3 exception 2)*
2. ~~Decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are of limited quantities such that a hazard of fire development or spread is not present.~~ *(relocated to Section 807.5.5)*

~~In Groups I-1 and I-2, combustible decorative materials shall meet the flame propagation criteria of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are of such limited quantities that a hazard of fire development or spread is not present. In Group I-3, combustible decorative materials are prohibited.~~ *(relocated to Section 807.5.6 and 807.5.7)*

~~Fixed or movable walls and partitions, paneling, wall pads and crash pads, applied structurally or for decoration, acoustical correction, surface insulation or other purposes, shall be considered interior finish if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered decorative materials or furnishings.~~ *(relocated to Section 807.3)*

~~In Group B and M occupancies, fabric partitions suspended from the ceiling and not supported by the floor shall meet Sections 807.2 and 807.3 the flame propagation performance criteria in accordance with Section 807.2 and NFPA 701 or shall be noncombustible.~~

~~**807.1.1(IBC [F]806.1.1)**~~ <u>**807.2 (IBC [F] 806.2)**</u> **Noncombustible materials.** The permissible amount of noncombustible decorative material shall not be limited.

~~**807.1.2 (IBC [F]806.1.1)**~~ <u>**807.3 (IBC [F] 806.3)**</u> **Combustible decorative materials.** <u>In other than Group I-3,</u> ~~The permissible amount of~~ <u>curtains, draperies, fabric hangings and other similar combustible</u> decorative materials <u>suspended from walls or ceilings shall be flame resistant</u> ~~meeting~~ ~~the flame~~

~~propagation performance criteria of NFPA 701~~ in accordance with Section 807.4 and shall not exceed 10 percent of the specific wall or ceiling area to which it is attached.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered *interior finish* if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered *decorative materials* or furnishings. *(relocated from Section 807.1)*

Exceptions:

1. In auditoriums in Group A, the permissible amount of curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings ~~meeting the flame propagation performance criteria of NFPA 701~~ shall not exceed 75 percent of the aggregate wall area where the building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code.*
2. In Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1. *(relocated and revised from Section 807.1, exception 1)*

3.~~2.~~ In Group B and M occupancies, the amount of fabric partitions suspended from the ceiling and not supported by the floor ~~in Group B and M occupancies~~ shall not be limited.

~~**807.2(IBC [F] 806.2)**~~ **807.4 (IBC [F] 806.4) Acceptance criteria and reports.** Where required to be flame resistant, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall be tested by an *approved* agency and meet the flame propagation performance criteria of NFPA 701~~, or such materials shall be noncombustible~~. Reports of test results shall be prepared in accordance with NFPA 701 and furnished to the *fire code official* upon request.

~~**807.4**~~ **807.5 Occupancy-based requirements.** In occupancies specified ~~in Group A, E and I-4 day care facilities~~, combustible decorative materials not complying with Section 807.3 ~~other than decorative vegetation~~ shall comply with Sections 807.5.1 ~~807.4.1~~ through ~~807.4.4.2~~ 807.5.7.

IFC 807.5.1 ~~**807.4.1**~~ **General.** ~~All of~~ The following requirements shall apply to all occupancies: ~~to all Group A and E occupancies and Group I-4 day care facilities regulated by Sections 807.4.2 through 807.4.4~~:

1. ~~Explosive or highly flammable materials:~~ Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. ~~Fire-retardant coatings:~~ Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. ~~Obstructions:~~ Furnishings or other objects shall not be placed to obstruct *exits,* access thereto, egress there from or visibility thereof.

807.5.2 ~~**807.4.2**~~ **Group A.** In Group A occupancies, the requirements in Sections ~~807.4.2.1~~ 807.5.2.1 through ~~807.4.2.3~~ 807.5.2.4 shall apply ~~to occupancies in Group A~~.

807.5.2.1 ~~**807.4.2.1**~~ **Foam plastics.** Exposed foam plastic materials and unprotected materials containing foam plastic used for decorative purposes or stage scenery or exhibit booths shall have a maximum heat release rate of 100 kW when tested in accordance with UL 1975, or when tested in accordance with NFPA 289 using the 20 kW ignition source.

Exceptions:

1. Individual foam plastic items or items containing foam plastic where the foam plastic does not exceed 1 pound (0.45 kg) in weight.
2. Cellular or foam plastic shall be allowed for trim in accordance with Section 804.2.

807.5.2.2 ~~807.4.2.2~~ Motion Picture Screens. The screens upon which motion pictures are projected in new and existing buildings shall either ~~meet the flame propagation performance criteria of NFPA 701~~ comply with Section 807.4 or shall comply with the requirements for a Class B interior finish in accordance with Section 803 of the *International Building Code*.

807.5.2.3 ~~807.4.2.3~~ Wood use in ~~Group A-3~~ places of religious worship. In places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall ~~be allowed~~ not be limited.

807.5.2.4 ~~807.3 (IBC [F] 806.4)~~ Pyroxylin plastic. Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base shall not be used ~~in Group A occupancies~~.

807.5.3 ~~807.4.3~~ Group E. Group E occupancies, shall comply with Sections ~~the requirements in Sections 807.4.3.1~~ 807.5.3.1 through ~~and 807.4.3.2~~ 807.5.3.3 ~~shall apply to occupancies in Group E~~.

807.5.3.1 ~~807.4.3.1~~ Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* ~~smoke detection~~ fire alarm system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.5.3.2 ~~807.4.3.2~~ Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

807.5.3.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.5.4 ~~807.4.4~~ Group I-4~~, day care facilities.~~ Group I-4 occupancies shall comply with, the requirements in Section~~s~~ ~~807.4.4.1~~ 807.5.4.1 through ~~and~~ ~~807.4.4.2~~ 807.5.4.2 ~~shall apply to day care facilities classified in Group I-4~~.

807.5.4.1 ~~807.4.4.1~~ Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* ~~smoke detection~~ fire alarm system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.5.4.2 ~~807.4.4.2~~ Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

807.5.4.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.5.5 Dormitories in Group R-2. In Group R-2 dormitories, within sleeping units and dwelling units, the combustible decorative materials, shall be of limited quantities such that a hazard of fire development or spread is not present. *(relocated and revised from Section 807.1, exception 2)*

807.5.6 Groups I-1 and I-2. In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall be of such limited quantities that a hazard of fire development or spread is not present.*(relocated from Section 807.1)*

IFC 807.5.7 Group I-3. In Group I-3, combustible *decorative materials* are prohibited. *(relocated from Section 807.1)*

Reason: The proposed revision is intended to be a clarification of the combustible materials permitted within a space. Specifically, to understand the different requirements for fabric-type decorative materials and paper-type decorative materials and what quantities of each are permitted in various use groups.

Currently, photographs and paintings, in some use groups, are required to be tested and certified to NFPA 701. The scope of this standard does not address paper items such as artwork and photographs and therefore was impossible to comply with.

The scope of NFPA 701 is as follows:
"*1.1.1* Test Method 1*
1.1.1.1 Test Method 1 shall apply to fabrics or other materials used in curtains, draperies, or other window treatments. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

1.1.1.2 Test Method 1 shall apply to single-layer fabrics and to multi-layer curtain drapery assemblies in which the layers are fastened together by sewing or other means. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

1.1.1.3 Test Method 1 shall apply to specimens having an areal density less than or equal to 700 g/m2 (21 oz/yd2), except where Test Method 2 is required to be used by 1.1.2."

Most revisions are editorial and serve to provide better clarity and to group requirements by use group.

807.1 – A general statement was needed so that the requirements match the Section title
The former text in 807.1 was re-organized and is now in Section 807.3 and 807.5 for better clarity.

807.2 – re-number only

807.3 - Since Group I-3 are limited to only non-combustible, the limitation is added to the front of the combustible materials.

The remainder of the sentence is revised for coordination with the next section on acceptance criteria and eliminating redundant reference to NFPA 701. That section starts out with "where required to be flame resistant". The limitation to "curtains, draperies, hangings and other decorative materials suspended from walls or ceilings" is in the first paragraph in Section 807.1. The addition of the words "fabric" hangings and other "similar" combustible decorative materials is to differentiate between fabrics and films that are covered under NFPA Standard 701 and other materials used for decorative effect, that are discussed in 807.5 for each use group.

Exception 1 is specific to Group A for percentage of materials complying with 701.

Exception 2, curtains for dormitories is relocated from 807.1. It was reformatted to be consistent with the exception for auditoriums. Revised language shown below:

> 2. In Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling ~~of *sleeping units* and *dwelling units* in dormitories in Group R-2~~ shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with ~~protected by~~ an *approved automatic sprinkler system* installed in accordance with Section 903.3.1 ~~and such materials are limited to not more than 50 percent of the aggregate area of walls~~.

Exception 3, reformatted to put groups first.

807.4 – Deleted text is not needed as this is addressed in 807.2. Added text is intended to specifically reference decorative items that are covered under the NFPA Standard.

807.5 – This proposed revision places requirements for multiple use groups in this section so the listing of groups was deleted. In addition, new section 807.1 already states this section is not applicable to decorative vegetation, so this language was deleted.

807.5.1 – these requirements should apply to all occupancies in this section.
Titles at the beginning of each sentence were redundant and not proper code language.

807.5.2 – text re-organized for consistency. The intent is to clarify the following conditions are applicable to Group A

807.5.2.1 – Re-number only

807.5.2.2 - Re-number. This is a subsection of Group A criteria, so group not needed. Consistency between subsections.

807.5.2.3 – Re-number. This is a subsection of Group A criteria, so group not needed. Plus, only in the title, not the text. Consistency between subsections.

807.5.2.4 - Relocated to group with Group A requirements. This is a subsection of Group A criteria, so group not needed. Consistency between subsections.

807.5.3 - text re-organized for consistency. The intent is to clarify the following conditions are applicable to Group E

807.5.3.1 – Re-number. Change in Exception 2 is for consistency in language with Section 907.

807.5.3.2 – Re title and re-number only.

807.5.3.3 - This provide guidance within the classroom as to how much art work is permitted.

807.5.4 - The intent of the first sentence is to clarify that the general provisions are applicable for Group I-4. The phrase "day care facilities" is redundant.

807.5.4.1 – Re-number. Change in Exception 2 is for consistency in language with Section 907.

807.5.4.2 – Re-title and re-number only.

807.5.4.3 – This provide guidance within the classroom as to how much art work is permitted.

807.5.5 - Relocate existing exception 2 in 807.1 related to Group R-2 dormitories. Language is similar to paper in school corridors. NFPA 701 does not apply to Photos or paintings. All Group R are now required to be sprinklered, so the threat of flame spread is reduced. Revised language shown below:

> **807.5.5 (IBC [F] 806.5.5) Dormitories in Group R-2.** In Group R-2 dormitories, within sleeping units and dwelling units, the combustible decorative materials, ~~including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are~~ shall be of limited quantities such that a hazard of fire development or spread is not present.

807.5.6 - Relocate existing Group I-1 and I-2 from 2nd paragraph of 807.1. New 807.3 would apply to curtains in all occupancies, including Group I-1 and I-2. This allowance is just for the paper permitted in the facilities. Revised language shown below:

> **IFC 807.5.6 Groups I-1 and I-2.** In Groups I-1 and I-2, combustible *decorative materials* shall ~~meet the flame propagation criteria of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are~~ be of such limited quantities that a hazard of fire development or spread is not present.

807.5.7 – Re-located from 2nd paragraph of 807.1. Also scoped in 807.3

Cost Impact: None

807.1-F-CARPENTER.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

SECTION 807
DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

807.1 (IBC [F]806.1) General. Combustible decorative materials, other than decorative vegetation, shall comply with Section 807.2

through 807.5.

<u>**807.2 General.** The following requirements shall apply to all occupancies:</u>

1. <u>Furnishings or decorative materials of an explosive or highly flammable character shall not be used.</u>
2. <u>Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.</u>
3. <u>Furnishings or other objects shall not be placed to obstruct *exits,* access thereto, egress there from or visibility thereof.</u>
4. <u>The permissible amount of noncombustible decorative materials shall not be limited.</u>

~~**807.2 (IBC [F] 806.2) Noncombustible materials.** The permissible amount of noncombustible decorative material shall not be limited.~~

807.3 (IBC [F] 806.3) Combustible decorative materials. In other than Group I-3, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall <u>comply</u> ~~be flame resistant~~ ~~in accordance~~ with Section 807.4 and shall not exceed 10 percent of the specific wall or ceiling area to which <u>they are</u> ~~it is~~ attached.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered *interior finish,* <u>shall comply with Section 803</u> ~~if they cover 10 percent or more of the wall or of the ceiling area,~~ and shall not be considered *decorative materials* or furnishings. *(relocated from Section 807.1)*

Exceptions:

1. In auditoriums in Group A, the permissible amount of curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall not exceed 75 percent of the aggregate wall area where the building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code.*

2. n Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1. *(relocated and revised from Section 807.1, exception 1)*

3. In Group B and M occupancies, the amount of <u>combustible</u> fabric partitions suspended from the ceiling and not supported by the floor <u>shall comply with Section 807.4 and</u> shall not be limited.

807.4 (IBC [F] 806.4) Acceptance criteria and reports. Where required to <u>exhibit improved fire performance</u> ~~be flame resistant~~, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall be tested by an *approved* agency and meet the flame propagation performance criteria of <u>Test 1 or Test 2, as appropriate of</u> NFPA 701 <u>or exhibit a maximum rate of heat release of 100kW when tested in accordance with NFPA 289, using the 20 kW ignition source</u>. Reports of test results shall be prepared in accordance with <u>the test method used</u> ~~NFPA 701~~ and furnished to the *fire code official* upon request.

807.5 Occupancy-based requirements. In occupancies, combustible decorative materials not complying with Section 807.3 shall comply with Sections 807.5.1 through 807.5.7.

~~**807.5.1 General.** The following requirements shall apply to all occupancies:~~

1. ~~Furnishings or decorative materials of an explosive or highly flammable character shall not be used.~~
2. ~~Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.~~
3. ~~Furnishings or other objects shall not be placed to obstruct *exits,* access thereto, egress there from or visibility thereof.~~

<u>807.5.1</u> ~~807.5.2~~ Group A. In Group A occupancies, the requirements in Sections 807.5.2.1 through 807.5.2.4 shall apply to occupancies in Group A.

<u>807.5.1.1</u> ~~807.5.2.1~~ Foam plastics. Exposed foam plastic materials and unprotected materials containing foam plastic used for decorative purposes or stage scenery or exhibit booths shall have a maximum heat release rate of 100 kW when tested in accordance with UL 1975, or when tested in accordance with NFPA 289 using the 20 kW ignition source.

Exceptions:

1. Individual foam plastic items or items containing foam plastic where the foam plastic does not exceed 1 pound (0.45 kg) in weight.
2. Cellular or foam plastic shall be allowed for trim in accordance with Section 804.2.

<u>807.5.1.2</u> ~~807.5.2.2~~ Motion Picture Screens. The screens upon which motion pictures are projected in new and existing buildings shall either comply with Section 807.4 or shall comply with the requirements for a Class B interior finish in accordance with Section 803 of the *International Building Code*.

__807.5.1.3__ ~~807.5.2.3~~ **Wood use in places of religious worship.** In places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall not be limited.

__807.5.1.4__ ~~807.5.2.4~~ **(IBC [F] 806.4) Pyroxylin plastic.** Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base shall not be used.

__807.5.2__ ~~807.5.3~~ **Group E.** Group E occupancies, shall comply with Sections the requirements in Sections 807.5.3.1 through 807.5.3.3

__807.5.2.1__ ~~807.5.3.1~~ **Storage in corridors and lobbies.** Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* fire alarm system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

__807.5.2.2__ ~~807.5.3.2~~ **Artwork in corridors.** Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

__807.5.2.3__ ~~807.5.3.3~~ **Artwork in classrooms.** Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

__807.5.3__ ~~807.5.4~~ **Group I-4, day care facilities.** Group I-4 occupancies shall comply with, the requirements in Sections 807.5.4.1 through 807.5.4.2 .

__807.5.3.1__ ~~807.5.4.1~~ **Storage in corridors and lobbies.** Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* fire alarm system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

__807.5.3.2__ ~~807.5.4.2~~ **Artwork in corridors.** Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

__807.5.3.3__ ~~807.5.4.3~~ **Artwork in classrooms.** Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

__807.5.4__ ~~807.5.5~~ **Dormitories in Group R-2.** In Group R-2 dormitories, within sleeping units and dwelling units, the combustible decorative materials, shall be of limited quantities such that a hazard of fire development or spread is not present. *(relocated and revised from Section 807.1, exception 2)*

__807.5.5__ ~~807.5.6~~ **Groups I-1 and I-2.** In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall be of such limited quantities that a hazard of fire development or spread is not present.*(relocated from Section 807.1)*

__807.5.6__ ~~807.5.7~~ **Group I-3.** In Group I-3, combustible *decorative materials* are prohibited. *(relocated from Section 807.1)*

Committee Reason: This proposal was seen as a good clarification and organization of the requirements in Section 807. A modification was presented that combined elements from F110-13 and made some additional adjustments to clarify the proposal. Section 807.2 in the modification was relocated from the proposed location 807.5.1. Section 807.2 was relocated into item 4 in the new section 807.2. Other revisions related to the appropriate application of NFPA 701 and the addition of NFPA 289 as a viable test for decorative materials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Dave Frable, representing U.S. General Services Administration, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

807.1 (IBC [F]806.1) General. Combustible decorative materials, other than decorative vegetation, shall comply with Section 807.2 through 807.5.

> <u>**Exception:** The provisions of Section 807 shall not apply to Group F, R-2 other than dormitories, R-3, S and U Occupancies.</u>

807.3 (IBC [F] 806.3) Combustible decorative materials. In other than Group I-3, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall comply with Section 807.4 and shall not exceed 10 percent of the specific wall or ceiling area to which they are attached. <u>See Section 807.5.6 for the requirements for Group I-3 occupancies.</u>

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered *interior finish,* shall comply with Section 803 and shall not be considered *decorative materials* or furnishings. *(relocated from Section 807.1)*

Exceptions:

1. In auditoriums in Group A, the permissible amount of curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall not exceed 75 percent of the aggregate wall area where the building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code.*
2. n Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1. *(relocated and revised from Section 807.1, exception 1)*
3. In Group B and M occupancies, the amount of combustible fabric partitions suspended from the ceiling and not supported by the floor shall comply with Section 807.4 and shall not be limited.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This proposal narrows down the applicability of these provisions. This is consistent to how the occupancies were regulated previously. R-2 dormitories were regulated previously but not R-2 occupancies in general. Additionally, as currently written it would apply to individual apartment units. Occupancies such as F and S are locations where the public is not likely to be present unlike Group M or A occupancies. The reference to the Group I-3 restrictions are necessary as they may be easily missed where currently placed in the new section 807.5.6.

Public Comment 2:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

<u>**IFC 807.5.3 Groups I-1 and I-2.** In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall comply with Sections 807.5.3.1 through 807.5.3.4.</u>

<u>**IFC 807.5.3.1 Group I-1 and Group I-2 Condition 1 within sleeping units and dwelling units.** In Group I-1 and Group I-2 Condition 1 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, within sleeping units and dwelling units, combustible decorative materials are limited to not more than 50 percent of the aggregate wall area.</u>

IFC 807.5.3.2 In Group I-1 and Group I-2 Condition 1 for areas other than within sleeping units and dwelling units. In Group I-1 and Group I-2 Condition 1 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, combustible decorative materials in areas other than within sleeping units and dwelling units are limited to not more than 30 percent of the aggregate wall area.

IFC 807.5.3.3 In Group I-2 Condition 2. In Group I-2 Condition 2 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, the combustible decorative materials are limited to not more than 30 percent of the aggregate wall area.

IFC 807.5.3.4 Other areas in Groups I-1 and I-2. In Group I-1 and I-2 occupancies, in areas not equipped throughout by an *approved automatic sprinkler system*, the combustible decorative materials, shall be of such limited quantities that a hazard of fire development or spread is not present.

~~**807.5.5 Groups I-1 and I-2.** In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall be of such limited quantities that a hazard of fire development or spread is not present.~~

807.5.4 ~~**807.5.6**~~ **Group I-3.** *(No change to text)*

807.5.5 ~~**807.5.3**~~ **Group I-4, day care facilities.** *(No change to text)*

807.5.5.1 ~~**807.5.3.1**~~ **Storage in corridors and lobbies.** *(No change to text)*

807.5.5.2 ~~**807.5.3.2**~~ **Artwork in corridors.** *(No change to text)*

807.5.5.3 ~~**807.5.3.3**~~ **Artwork in classrooms.** *(No change to text)*

807.5.6 ~~**807.5.4**~~ **Dormitories in Group R-2.** *(No change to text)*

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: The renumbering is to put the groups addressed in alphabetical order for ease of use.
Code change F109 was approved as modified as part of a coordination effort between F109 and F110. This is a good cleanup of the section and is indicated below as it will appear in the 2015 IBC. This change, along with the approval of F3, addressed the issues in F111 with the exception of the allowance for paper in assisted living facilities, nursing homes and hospitals.

The committee did not really express any reasons for not approving the percentages recommended. There was a floor modification that attempted to coordinate F111 with the coordination work being done with F109 and F110 which appeared to confuse the issue.

Section 807.5.5, dealing with Group I-2, while a relocation of existing language, is very open for interpretation and/or unenforceable. This proposal for Section 807.5.3, replaces Section 807.5.5, and pulls the more exact language in F111 to put it here to address situations in Group I-1 and I-2 facilities such as assisted living, nursing homes and hospitals.

SECTION 807 (IBC [F] 806)
DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

807.1 (IBC [F]806.1) General. Combustible decorative materials, other than decorative vegetation, shall comply with Section 807.2 through 807.5.

807.2 (IBC [F]806.2) General. The following requirements shall apply to all occupancies:

1. Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. Furnishings or other objects shall not be placed to obstruct *exits,* access thereto, egress there from or visibility thereof.
4. The permissible amount of noncombustible decorative materials shall not be limited.

807.3 (IBC [F] 806.3) Combustible decorative materials. In other than Group I-3, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall comply with Section 807.4 and shall not exceed 10 percent of the specific wall or ceiling area to which they are attached.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered *interior finish* shall comply with Section 803 and shall not be considered *decorative materials* or furnishings.

Exceptions:

1. In auditoriums in Group A, the permissible amount of curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall not exceed 75 percent of the aggregate wall area where the building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code.*

2. In Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.
3. In Group B and M occupancies, the amount of combustible fabric partitions suspended from the ceiling and not supported by the floor shall comply with Section 807.4 and shall not be limited.

807.4 (IBC [F] 806.4) Acceptance criteria and reports. Where required to exhibit improved fire performance, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall be tested by an *approved* agency and meet the flame propagation performance criteria of Test 1 or Test 2, as appropriate of NFPA 701 or exhibit a maximum rate of heat release of 100kW when tested in accordance with NFPA 289, using the 20 kW ignition source. Reports of test results shall be prepared in accordance with the test method used and furnished to the *fire code official* upon request.

807.5 Occupancy-based requirements. In occupancies, combustible decorative materials not complying with Section 807.3 shall comply with Sections 807.5.1 through 807.5.7.

807.5.1 Group A. In Group A occupancies, the requirements in Sections 807.5.2.1 through 807.5.2.4 shall apply to occupancies in Group A.

807.5.1.1 Foam plastics. Exposed foam plastic materials and unprotected materials containing foam plastic used for decorative purposes or stage scenery or exhibit booths shall have a maximum heat release rate of 100 kW when tested in accordance with UL 1975, or when tested in accordance with NFPA 289 using the 20 kW ignition source.

Exceptions:

1. Individual foam plastic items or items containing foam plastic where the foam plastic does not exceed 1 pound (0.45 kg) in weight.
2. Cellular or foam plastic shall be allowed for trim in accordance with Section 804.2.

807.5.1.2 Motion Picture Screens. The screens upon which motion pictures are projected in new and existing buildings shall either comply with Section 807.4 or shall comply with the requirements for a Class B interior finish in accordance with Section 803 of the *International Building Code*.

807.5.1.3 Wood use in places of religious worship. In places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall not be limited.

807.5.1.4 Pyroxylin plastic. Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base shall not be used.

807.5.2 Group E. Group E occupancies, shall comply with Sections the requirements in Sections 807.5.3.1 through 807.5.3.3

807.5.2.1 Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* fire alarm system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.5.2.2 Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

807.5.2.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.5.3 Group I-4, day care facilities. Group I-4 occupancies shall comply with, the requirements in Sections 807.5.4.1 through 807.5.4.2 .

807.5.3.1 Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* fire alarm system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.5.3.2 Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

807.5.3.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.5.4 Dormitories in Group R-2. In Group R-2 dormitories, within sleeping units and dwelling units, the combustible decorative materials, shall be of limited quantities such that a hazard of fire development or spread is not present.

807.5.5 Groups I-1 and I-2. In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall be of such limited quantities that a hazard of fire development or spread is not present.

807.5.6 Group I-3. In Group I-3, combustible *decorative materials* are prohibited.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Public Comment 3:

Marcelo M. Hirschler, (GBH International), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

807.5.3 Groups I-1 and I-2. In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall comply with Sections 807.5.3.1 through 807.5.3.4.

807.5.3.1 Group I-1 and Group I-2 Condition 1 within units. In Group I-1 and Group I-2 Condition 1 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, within sleeping units and dwelling units, combustible decorative materials placed on walls shall be limited to not more than 50 percent of the wall area to which they are attached.

807.5.3.2 In Group I-1 and Group I-2 Condition 1 for areas other than within units. In Group I-1 and Group I-2 Condition 1 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, combustible decorative materials placed on walls in areas other than within dwelling and sleeping units shall be limited to not more than 30 percent of the wall area to which they are attached.

807.5.3.3 In Group I-2 Condition 2. In Group I-2 Condition 2 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, combustible decorative materials placed on walls shall be limited to not more than 30 percent of the wall area to which they are attached.

807.5.3.4 Other areas in Groups I-1 and I-2. In Group I-1 and I-2 occupancies, in areas not equipped throughout by an *approved automatic sprinkler system*, combustible decorative materials shall be of such limited quantities that a hazard of fire development or spread is not present.

~~**807.5.5 Groups I-1 and I-2.** In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall be of such limited quantities that a hazard of fire development or spread is not present.~~

807.5.4 ~~**807.5.6**~~ **Group I-3.** *(No change to text)*

807.5.5 ~~**807.5.3**~~ **Group I-4, day care facilities.** *(No change to text)*

807.5.5.1 ~~**807.5.3.1**~~ **Storage in corridors and lobbies.** *(No change to text)*

807.5.5.2 ~~**807.5.3.2**~~ **Artwork in corridors.** *(No change to text)*

807.5.5.3 ~~**807.5.3.3**~~ **Artwork in classrooms.** *(No change to text)*

<u>807.5.6</u> ~~807.5.4~~ Dormitories in Group R-2. *(No change to text)*

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This comment proposes to integrate the proposed additional requirements (with sprinkler trade-offs) for Group I-1 and Group I-2 Condition 1 occupancies, as proposed by F111, within the accepted language of proposal F109. The proposed language would replace section 807.5.5 from the approved as modified version of proposal F109 by the new language in Section 807.5.3 . The renumbering is consistent with the alphabetical order of the occupancies.. The only other minor added changes made to the proposed language in F111 are the use of the words "decorative materials placed on walls" (because it is not possible to measure decorative materials placed other than on walls) and basing the limitation on the walls to which the decorative materials are attached because that provides added safety.

F109-13

Final Action: AS AM AMPC____ D

F112-13

808.1, 808.2, 5003.8.7.1, 5003.9.10, 5005.1.10, 5704.3.2.1.1, 5705.2.4, Chapter 80

Proposed Change as Submitted

Proponent: Glen Carter, Justrite Manufacturing Company LLC

Revise as follows:

808.1 Wastebaskets and linen containers in Group I-1, I-2 and I-3 occupancies. Wastebaskets, linen containers and other waste containers, including their lids, located in Group I-1, I-2 and I-3 occupancies shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m2 in the horizontal orientation. Metal wastebaskets and other metal waste containers with a capacity of 20 gallons (75.7 L) or more shall be listed in accordance with UL 1315 or approved in accordance with FM 6921 and shall be provided with a noncombustible lid. Portable containers exceeding 32 gallons (121 L) shall be stored in an area classified as a waste and linen collection room and constructed in accordance with Table 509 of the International Building Code.

808.2 Waste containers with a capacity of 20 gallons or more in Group R-2 college and university dormitories. Waste containers, including their lids, located in Group R-2 college and university dormitories, and with a capacity of 20 gallons (75.7 L) or more, shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m2 in the horizontal orientation. Metal wastebaskets and other metal waste containers with a capacity of 20 gallons (75.7 L) or more shall be listed in accordance with UL 1315 or approved in accordance with FM 6921 and shall be provided with a noncombustible lid. Portable containers exceeding 32 gallons (121 L) shall be stored in an area classified as a waste and linen collection room constructed in accordance

5003.8.7.1 Construction. The interior of cabinets shall be treated, coated or constructed of materials that are nonreactive with the hazardous material stored. Such treatment, coating or construction shall include the entire interior of the cabinet. Cabinets shall either be listed in accordance with UL 1275 or approved in accordance to FM 6050 as suitable for the intended storage or constructed in accordance with the following: with Table 509 of the International Building Code.

5003.9.10 Safety cans. Safety cans shall be listed in accordance with UL 30, UL 1313, or approved in accordance with FM 6051 and FM 6052 when used to increase the maximum allowable quantities per control area of flammable or combustible liquids in accordance with Table 5003.1.1(1). ~~Safety cans listed in accordance with UL 1313 are allowed for flammable and combustible liquids when not used to increase the maximum allowable quantities per control area and for other hazardous material liquids in accordance with the listing.~~

5005.1.10 Liquid transfer. Liquids having a hazard ranking of 3 or 4 in accordance with NFPA 704 shall be transferred by one of the following methods:

1. From safety cans complying with UL 30, UL 1313 or with FM 6051 and FM 6052.

2 through 5 *(No change to current text)*

5704.3.2.1.1 Materials. Cabinets shall be listed in accordance with UL 1275, or approved in accordance to FM 6050, or constructed of approved wood or metal in accordance with the following:

5705.2.4 Class I, II and III liquids. Class I liquids or when heated to or above their flash points, Class II and Class III liquids shall be transferred by one of the following methods:

1. From safety cans complying with UL 30, UL 1313 or with FM 6051 and FM 6052

2 through 5 *(No change to current text)*

Add standards to Chapter 80 as follows:

FM

6050-96	Approval Standard for Storage Cabinets (Flammable and Combustible Liquids
6051 and 6052-76	Approval Standard for Safety Containers and Filling, Supply and Disposal Containers
6921-04	Approval Standard for Cabinets for Combustible Waste

Reason:

1) For those proposals adding the appropriate FM Approval standard: FM Approvals is a nationally and globally recognized laboratory who just like UL has construction specifications these safety products have to be built to, performance specification these safety products are tested to before an approval is issued.

FM Approvals publish an approval guide that lists all the products they have approved. And FM Approvals conducts periodic quality assurance audits to assure the approved products are manufactured to the same standards as those products and designs that were submitted for evaluation. All design changes are submitted to FM Approvals for their approval prior to those changes being allowed. The fire tests conducted by both organizations (UL & FM) on these products are to the same time temperature curve.

It is in this spirit that FM Approvals should be included in the IFC as a nationally & globally recognized approval laboratory.

2) For those proposals 5003.9.10, 5005.1.10, and 5705.2.4 I am proposing adding UL 1313 for Non-metallic Safety Cans. Non-metallic safety cans are tested the same way as metallic safety cans and are as safe or safer than the metallic safety cans. If you had ever seen a non-metallic safety can in a fire test you would no longer be a skeptical.

   a) Intuitively, it is hard to imagine a safety san made of polyethylene surviving a fire test. I was curious about this concept until I witnessed our non-metallic safety can in a fire test conducted at UL. In the fire test, the safety can performed very admirably in the way the design met its goals, in not contributing to the spread of fire. Our non-metallic safety can vented on cue. As the vented vapors were being consumed by fire, the level of the liquid fuel lowered in the can. In turn the polyethylene started to melt but, only in the void above the fluid level. The liquid fuel level was protecting the can from melting further by absorbing the heat. As the fluid level went down the safety can's walls melted inward and further down the height of the can above the fuel level. This continued until all the fuel inside the safety can had been consumed while contained within the safety can's walls. There was no spew of fuel; no rupture of the safety can spreading fuel all over the area. That is exactly the intended result of a well-designed safety can. I believe once anyone has witnessed this test and understood the consequences they would be compelled to agree too.
   b) There are numerous flammable and combustible liquids that are incompatible with metallic safety cans. As an example, isopropyl alcohol will begin to pit a metallic safety can until micro leaks begin to occur. The only safe and compatible solution for storage of this liquid and others is a non-metallic safety can.
   c) A non-metallic safety can is definitely more robust during a drop test; our non-metallic safety can designs will rebound undamaged because of its superior thick wall strength. The metallic safety can in a drop test will result in a dented and crumpled shell. Both meet the criteria of a safety can but you cannot top the strength and resilience of the poly can.
   d) Metallic and non-metallic safety cans both benefit work place safety and each are recognized by many local, state, and federal laws. Non-metallic safety cans would be a loss to the safety community if it is not recognized. It is hard to picture what legal & safe alternative will be available to those whose processes that currently requiring non-metallic safety cans. Non-metallic safety cans have long provided a safe solution over makeshift consumer gasoline cans or glass/plastic carboys etc...

Note: The FM 6051 and 6052 are a combined specification covering metallic and non-metallic safety cans.

3) I am proposing the deletion illustrated in section 5003.9.10 to allow non-metallic safety cans to be used to allow the increase of MAQs in a control area for those reasons described in 2 a), b), c), & d) above.

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

Analysis: A review of the standards proposed for inclusion in the code, FM 6050-96, FM 6051 and 6052-76 and FM 6921-04 , with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. The standard UL 1313 is currently referenced within the IFC.

F112-808.1-F-CARTER

Committee Action Hearing Results

The following is an errata that was not posted to the ICC website.

The bolded current text was not printed with the original proposal:

808.2 Waste containers with a capacity of 20 gallons or more in Group R-2 college and university dormitories. Waste containers, including their lids, located in Group R-2 college and university dormitories, and with a capacity of 20 gallons (75.7 L) or more, shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m2 in the horizontal orientation. Metal wastebaskets and other metal waste containers with a capacity of 20 gallons (75.7 L) or more shall be listed in accordance with UL 1315 <u>or approved in accordance with FM 6921</u> and shall be provided with a noncombustible lid. Portable containers exceeding 32 gallons (121 L) shall be stored in an area classified as a waste and linen collection room constructed in accordance **with Table 509 of the *International Building Code***.

(Portions of proposal not shown remain unchanged)

For staff analysis of the content of FM 6050-96, FM 6051 and 6052-76 and FM 6921-04 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: Disapproved

Committee Reason: The proposal was not ready for implementation. One particular concern was that Section 5705.2.4 addresses heated liquids, which is outside the scope of the proposed referenced standard UL1313. Also there was confusion with the term "approved" as it is used differently within the proposal than as defined in Section 202. There was also concern that materials other than metal were being addressed in a section only dealing with metal containers.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

808.1 Wastebaskets and linen containers in Group I-1, I-2 and I-3 occupancies. Wastebaskets, linen containers and other waste containers, including their lids, located in Group I-1, I-2 and I-3 occupancies shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m2 in the horizontal orientation. Metal wastebaskets and other metal waste containers with a capacity of 20 gallons (75.7 L) or more shall be listed in accordance with UL 1315 or ~~approved in accordance with~~ FM 6921 and shall be provided with a noncombustible lid. Portable containers exceeding 32 gallons (121 L) shall be stored in an area classified as a waste and linen collection room and constructed in accordance with Table 509 of the International Building Code.

> <u>**Exception:**</u> <u>Portable containers complying with FM6921 and limited to clean waste recycling or disposal of patient records and does not exceed 96 gallons (363 L) shall not be required to be stored in an area classified as a waste and linen collection room.</u>

(Portions of proposal not shown remain unchanged.)

Reason: This allows for the option of compliance with FM6921 and addresses the committees concern over the "approved" language. The scope of this public comment is limited to concerns with Group I-2 concerns and their 'green' recycling initiatives and patient privacy with regard to proper disposal of medical records.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the <u>American Society for Healthcare Engineering</u>, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

F112-13

Final Action: AS AM AMPC____ D

F119-13
903.2.1

Proposed Change as Submitted

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

903.2.1 Group A. An *automatic sprinkler system* shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the *automatic sprinkler system* shall be provided throughout the floor area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and in all floors from the Group A occupancy to, and including, the nearest *level of exit discharge* serving the Group A occupancy. For Group A-5 occupancies, the *automatic sprinkler system* shall be provided in the spaces indicated in Section 903.2.1.5.

903.2.1.1 Group A-1. An *automatic sprinkler system* shall be provided for Group A-1 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m^2).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. ~~The *fire area* contains a multitheater complex.~~ <u>When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.</u>

903.2.1.2 Group A-2. An *automatic sprinkler system* shall be provided for Group A-2 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 5,000 square feet (464 m^2).
2. The *fire area* has an *occupant load* of 100 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. <u>When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.</u>

903.2.1.3 Group A-3. An *automatic sprinkler system* shall be provided for Group A-3 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m^2).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. <u>When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.</u>

903.2.1.4 Group A-4. An *automatic sprinkler system* shall be provided for Group A-4 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m^2).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. <u>When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.</u>

Reason: Under the current provisions for sprinkler protection is assembly occupancies, the option of a fire area allows for compartmentation to be utilized in place of installing a sprinkler system. The issue with this arrangement is that multiple small assembly occupancies can be placed in a single story building and not trigger a sprinkler system because of the installation of a rated corridor and separation wall.

This proposal adds the requirement that sprinkler systems shall be added when the convergence of more than 300 persons shares an exit. This is consistent with the intent of autoamtic sprinkler systems being required for life safety and to maintain tenable exiting in a fire event. A fire event that is near an exit is the same whether there are 300 occupants in one room or three rooms with 100 occupants each sharing an exit. This is also consistent with the requirement in the current IFC for A-1 occupancies in 'multitheater complex", which is a requirement for anytime two or more theaters are in the same tenancy and does not consider occupant load as a trigger.

This proposal still provides options for those single story buildings with mutliple tenancies that have separate exits and utilize the fire area separation concept; such as buildings with multiple restaurants with separate entrances and strip-style mall buildings.

The State of New York has had experience in both fire losses and new building construction with this topic. FIrst, the Stouffer's Inn and conference center in 1981 killed 23 top-level executives when a fire in a common hallway trapped occupants in several small (50-100 person) conference rooms. Second, the fire area method of separating A-3 occupancies has provided a way to not sprinkler college and university lecture room buildings by separating the spaces but having room occupant loads approaching 1,000 people in the common hallway.

This proposal is submitted with the endorsement of the New York State Building Officials Conference, the New York State Fire Marshals and Inspectors Association, and the Association of Fire Districts of New York State.

Cost Impact: For buildings that have previously utilized the passive method of separating assembly occupancies when exiting is shared, this will increase the cost of construction due to the additional sprinkler requirement.

903.2.1-F-NICHOLS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The terminology "when separate fire areas share exit or exit access components" was confusing. More specifically it was unclear what occupancies were sharing with the Group A occupancy. Second, concerns were raised with the deletion of the specific requirement for multi-theater complexes.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Daniel E. Nichols, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

<u>**903.2.1.6 Multiple fire areas**. An automatic sprinkler system shall be provided where multiple fire areas of Group A-1, A-2, A-3, or A-4 occupancies share exit or exit access components and the combined occupant load of these fire areas is 300 or more.</u>

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: Much discussion was held on this topic in Dallas; mainly regarding the potential confusion of the language, the applicability to buildings with different types of assembly use groups, and coordination with other sections of the IBC.

This public comment has moved the originally proposed modifications to 903.2.1.1 through 903.2.1.4 to a new 903.2.1.6. This modification is done to address the different assembly use group issue. The language of the proposal has been modified to create a qualifier (…where multiple fire areas of Group A-1....) and the two conditions (1. share exit or exit access components and 2. the occupant load of the fire area is 300 or more). This is done to minimize confusion of when this section is used, as well as to direct the code user what the bounds of the occupant load are (i.e. the occupant load of the fire areas, not the exit or exit access components).

The multitheater complex is being retained. No changes to 903.2.1.1 through 903.2.1.4 are being considered in this proposal.

F119-13

Final Action: AS AM AMPC____ D

F120-13
903.2.1

Proposed Change as Submitted

Proponent: Carl D. Wren, P.E., Austin Fire Department, representing self (carl.wren@austintexas.gov)

Revise as follows:

903.2.1 Group A. An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the automatic sprinkler system shall be provided throughout the floor ~~area~~ where the fire area containing the Group A-1, A-2, A-3 or A-4 occupancy is located, and ~~in~~ throughout all floors of the building ~~from~~ above or below the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy. For Group A-5 occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.

903.2.1.1 Group A-1. An automatic sprinkler system shall be provided for fire areas containing Group A-1 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.
4. The fire area contains a multitheater complex.

903.2.1.2 Group A-2. An automatic sprinkler system shall be provided for fire areas containing Group A-2 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (464 m2).
2. The fire area has an occupant load of 100 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.3 Group A-3. An automatic sprinkler system shall be provided for fire areas containing Group A-3 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.4 Group A-4. An automatic sprinkler system shall be provided for fire areas containing Group A-4 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.5 Group A-5. An automatic sprinkler system shall be provided for Group A-5 occupancies in the following areas: concession stands, retail areas, press boxes and other accessory use areas in excess of 1,000 square feet (93 m2).

Reason: The current code language can be somewhat confusing since the charging language in 903.2.1 deals with the occupancy and certain building areas outside the occupancy but the language in subsections 903.2.1.1, 903.2.1.2, 903.2.1.3 and 903.2.1.4 require the "occupancy" to be protected by fire sprinklers while it addresses the thresholds in terms of the size of the "fire area". It is not the intent of this proposal to change the requirements of this section, only to clarify them.

Cost Impact: This code change is being proposed as an effort to clarify potentially confusing language and will not increase the cost of construction.

903.2.1F-WREN

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

903.2.1 Group A. An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the automatic sprinkler system shall be provided throughout the floor where the fire area containing the Group A-1, A-2, A-3 or A-4 occupancy is located, and throughout all floors of the building <u>from</u> ~~above or below~~ the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy. For Group A-5 occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.

903.2.1.1 Group A-1. An automatic sprinkler system shall be provided for fire areas containing Group A-1 occupancies and intervening floors of the building ~~that impact the egress pathways~~ where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.
4. The fire area contains a multi-theater complex.

903.2.1.2 Group A-2. An automatic sprinkler system shall be provided for fire areas containing Group A-2 occupancies and intervening floors of the building ~~that impact the egress pathways~~ where one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (464 m2).
2. The fire area has an occupant load of 100 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.3 Group A-3. An automatic sprinkler system shall be provided for fire areas containing Group A-3 occupancies and intervening floors of the building ~~that impact the egress pathways~~ where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.4 Group A-4. An automatic sprinkler system shall be provided for fire areas containing Group A-4 occupancies and intervening floors of the building ~~that impact the egress pathways~~ where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.5 Group A-5. An automatic sprinkler system shall be provided for Group A-5 occupancies in the following areas: concession stands, retail areas, press boxes and other accessory use areas in excess of 1,000 square feet (93 m2).

Committee Reason: The committee felt that this proposal better clarified the application of 903.2.1 than proposal F117-13. Several modifications were made to further clarify the application of the proposal. The first removes “above or below” and restores the term “from.” This will address above or below grade situations as necessary. The next modification removes the language “that impact the egress pathways” as the language was felt difficult to enforce.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gregory R. Keith, Professional heuristic Development, representing The Boeing Company, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.2.1 Group A. An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the automatic sprinkler system shall be provided throughout the story ~~floor~~ where the fire area containing the Group A-1, A-2, A-3 or A-4 occupancy is located, and throughout all stories ~~floors~~ of the building from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy. For Group A-5 occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.

903.2.1.1 Group A-1. An automatic sprinkler system shall be provided for fire areas containing Group A-1 occupancies and intervening floors of the building where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.
4. The fire area contains a multi-theater complex.

903.2.1.2 Group A-2. An automatic sprinkler system shall be provided for fire areas containing Group A-2 occupancies and intervening floors of the building where one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (464 m2).
2. The fire area has an occupant load of 100 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.3 Group A-3. An automatic sprinkler system shall be provided for fire areas containing Group A-3 occupancies and intervening floors of the building where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.4 Group A-4. An automatic sprinkler system shall be provided for fire areas containing Group A-4 occupancies and intervening floors of the building where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.5 Group A-5. An automatic sprinkler system shall be provided for Group A-5 occupancies in the following areas: concession stands, retail areas, press boxes and other accessory use areas in excess of 1,000 square feet (93 m2).

Commenter's Reason: This public comment for approval as further modified is intended to be entirely editorial in nature. It replaces the term "floor(s)" with the term "story(s)" in two locations. Floor is not a defined term in the IBC or IFC. Story is a defined term: "That portion of a building included between the upper surface of a floor and the upper surface of the floor… Additionally, Section 903.2.1 refers to the "level of exit discharge." That term is defined as, "The story at the point at which an exit terminates and an exit discharge begins." Replacement of the term "floor" with the term "story" will be consistent with current IBC/IFC terminology and will assist code users by clarifying the application of this important provision.

Public Comment 2:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.2.1 Group A. An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. ~~For Group A-1, A-2, A-3 and A-4 occupancies, the automatic sprinkler system shall be provided throughout the floor where the fire area containing the Group A-1, A-2, A-3 or A-4 occupancy is located, and throughout all floors of the building from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy. For Group A-5 occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.~~

903.2.1.1 Group A-1. An automatic sprinkler system shall be provided ~~for~~ throughout the floor where fire areas containing Group A-1 occupancies are located and ~~intervening floors~~ throughout all floors of the building from the Group A-1 occupancy to, and including, the nearest level of exit discharge serving the Group A-1 occupancy where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.
4. The fire area contains a multi-theater complex.

903.2.1.2 Group A-2. An automatic sprinkler system shall be provided ~~for~~ throughout the floor where fire areas containing Group A-2 occupancies are located and ~~intervening floors~~ throughout all floors of the building from the Group A-2 occupancy to, and including, the nearest level of exit discharge serving the Group A-2 occupancy ~~of the building~~ where one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (464 m2).
2. The fire area has an occupant load of 100 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.3 Group A-3. An automatic sprinkler system shall be provided ~~for~~ throughout the floor where fire areas containing Group A-3 occupancies are located and ~~intervening floors~~ throughout all floors of the building from the Group A-3 occupancy to, and including, the nearest level of exit discharge serving the Group A-3 occupancy ~~of the building~~ where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.4 Group A-4. An automatic sprinkler system shall be provided ~~for~~ throughout the floor where fire areas containing Group A-4 occupancies are located and ~~intervening floors~~ throughout all floors of the building from the Group A-4 occupancy to, and including, the nearest level of exit discharge serving the Group A-4 occupancy ~~of the building~~ where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.5 Group A-5. An automatic sprinkler system shall be provided for Group A-5 occupancies in the following areas: concession stands, retail areas, press boxes and other accessory use areas in excess of 1,000 square feet (93 m2).

Commenter's Reason: The proposal clarified the questions of whether sprinklers are required only in the occupancy or also outside the occupancy. Another question arises, however, of whether sprinklers are required on the floor where the A occupancy is located, or in the fire area which may be different than the floor. The charging paragraph says sprinklers are required throughout the floor, but the subsections only require sprinklers in the fire area. (In both places, the sprinklers are required to extend to the level of exit discharge.) To clarify, this modification moves language from the charging paragraph to the subsections for each A group. The modification also clarifies what is meant by "intervening floors." The original proposal doesn't clearly state what the floors intervene between. Any redundancy created by the modification is justified by the additional clarity and ease of applying the Group A sprinkler requirements.

F120-13

Final Action: AS AM AMPC____ D

F124-13
903.2.1.6 (New)

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

903.2.1.6 (IBC [F] 903.2.1.6) Assembly use on roofs. Where an occupied roof has an assembly use with an occupant load exceeding 100, all floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Reason: Currently the code states that if you have a fire area containing an A-2 Assembly on a floor other than the floor of exit discharge, that floor level and all floors to the level of exit discharge must be sprinklered. Frequently, roof tops are being used and occupied as assemblies. Building owners will provide an open air roof-top bar or lounge, or other use similar to a Group A-2 occupancy on the roof of a building.

The roof of the building does not meet the definition of a fire area. So protection of the occupants can be less than what would otherwise be required if the occupancy was on a floor rather than on the roof.

The current fire sprinkler threshold for Group A-2 is an occupant load of 100. It is appropriate to apply this same threshold to the occupant load on the roof.

This proposal will require that when a roof top is occupied for an assembly use AND the occupant load exceeds 100, then the building must be protected with sprinklers. This proposal does not require that the roof top itself is sprinklered, but provides sprinkler protection on all floors to the level of exit discharge.

The reference to Section 903.3.1.2 is added, since this use can occur on the roof of multi-family housing facilities.

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

903.2.1.6 (NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

903.2.1.6 (IBC [F] 903.2.1.6) Assembly ~~use~~ occupancy on roofs. Where an occupied roof has an assembly ~~use~~ occupancy with an occupant load exceeding 100, all floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Committee Reason: Requiring an automatic sprinkler system within a building where a group A occupancy is located on the roof was felt to be a necessary lifesafety requirement. This is consistent with the requirements in Section 903.2.1 that protect the occupants from hazards they may need to egress through. The occupants of the Group A occupancy, whether within the building or on the roof, are unaware of the hazards in the building and need to evacuate through the building. There was some concern that this proposal along with F122-13 were overly restrictive. Sprinklers would be required when the occupant load of the Group A occupancy exceeds 100. The modification revises the term "use" to "occupancy" to be consistent with the use of the terms in the I-Codes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Emory Rodgers, VDHCO, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.2.1.6 Assembly occupancy on roofs. Where an occupied roof has an assembly occupancy with an occupant load exceeding 100 <u>for Group A-2 and 300 for other Group A occupancies,</u> all floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Commenter's Reason:

- Other Group A occupancies require sprinklers at 300 occupants not 100 that is only for A-2's. These other Group A's could have roof assemblies.
- The fire data clearly demonstrates there is no need to have such stringency for all other Group A occupancies
- In fact this Group A roof assembly and the 903.2.1 for Group A occupancies already will trigger sprinklers for any unsprinkled occupancy with a Group A-2 occupancy when on a 1st floor for that entire floor to be sprinkled or any other floors to sprinkle the entire building.
- Support the AM challenge for open parking garages and this AM challenge to allow 300 occupants for Group A-1's, A-3's and A-4's.

Public Comment 2:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.2.1.6 (IBC [F] 903.2.1.6) Assembly occupancy on roofs. Where an occupied roof has an assembly occupancy with an occupant load exceeding 100, all floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

<u>**Exception:** Open parking garages of Type I or II construction.</u>

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

The proposed exception for open parking garages is consistent with the existing code requirement exception for open parking garages under Section 903.2.11.3 for "Buildings 55 feet or more in height".

It is becoming more common in the urban renewal areas throughout the US that jurisdictions are asking developers to provide additional recreational and green spaces for its citizens to enjoy within their own communities. Because of the limited space available it is not uncommon for such recreational and green spaces to be provided on the roofs of open parking garages. Based on the existing wording of this new Section (903.2.1.6) of code, these recreational and green spaces greater than 700 sq. ft. (based on 7 sq. ft. net /occupant) or 1500 sq. ft. (based on 15 sq. ft. net /occupant) would now require the open parking garage to be sprinklered. In other words, an open recreational or green space on a roof of an open parking structure that is more than a 26' to 39' square would require the garage to be sprinklered with a dry pipe sprinkler system that is initially a major cost to the project as well as a major monthly and yearly maintenance expense. Such an expense would most likely have an adverse affect on developers doing major city urban renewal projects from agreeing to provide such amenities for the local jurisdiction.

There is considerable supporting data for this proposed exception for open parking garages in the following national publications:

1. 2006 NFPA Fire Data Report, "Structure and Vehicle Fires in General Vehicle Parking Garages"
2. 2008 Parking Consultants Council Fire Safety Committee Report, "Parking Structure Fire Facts

These fire reports provide the following justifications for support of this public comment:

1. There is an average of only 660 fire/year in **all** types of parking garages in the US. This represents only 0.006% of all the annual fires/year in the US in all occupancy classifications. These fires caused an annual average of under one death, 11 injuries. However, for parking garages constructed of Construction Type I or II, they account for only 200 fire/year with no fire deaths, and only 2 injuries/year. Therefore, fires in parking garages occur very infrequently, especially for Construction Type I or Type II parking garages.
2. No structural damage occurred in 98.7% of vehicle fires in parking garages.
3. Vehicle fires in parking garages typically do not spread (external spread of vehicle fires occurred in only 7% of the incidents).

Public Comment 3:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing National Multi Housing Council, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.2.1.6 (IBC [F] 903.2.1.6) Assembly occupancy on roofs. Where an occupied roof has an assembly occupancy with an occupant load exceeding 100, all floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Exception: Open Parking Garages of Construction Type I or II.

Commenter's Reason: This comment is not challenging the addition of a general requirement to sprinkler building areas beneath an unenclosed assembly use located on a roof. However, adding this requirement for buildings having a rooftop assembly area with an open parking garage beneath is excessive. There has been no documentation presented to suggest that such an arrangement would expose occupants of the open rooftop area to any significant risk. Although a vehicle fire below may transmit some smoke to the roof, it is incumbent on the proponent to demonstrate that the level of associated risk for such an event is acute to warrant a new requirement. Lacking that demonstration, the proposed exception, which has been limited to Type I and Type II construction, is appropriate, and it is consistent with many other allowances for open parking structures in the IBC and IFC.

Public Comment 4:

David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects, requests Disapproval.

Commenter's Reason: Adding requirements for levels below the roof to be protected without any consideration for the number of levels and the configuration of the means of egress from the roof is inappropriate. A single story building with a rooftop dining area or bar would be required to install sprinklers in the first floor even if it had no connection with the rooftop operation and shared no means of egress with that floor.

F124-13

Final Action: AS AM AMPC____ D

F125-13
903.2.2 (New)

<u>Proposed Change as Submitted</u>

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Add new text as follows:

<u>**903.2.2 Group B.** An *automatic sprinkler system* shall be provided throughout all buildings containing a Group B occupancy where a Group B *fire area* is located more than three stories above grade plane.</u>

~~**903.2.2**~~ **<u>903.2.2.1</u> Ambulatory Care Facilities.** (No Changes)

Reason: This proposal is to set a requirement for automatic sprinkler systems to be installed in mid-rise business occupancies. Currently, the only requirement for automatic sprinkler protection in Group B occupancies is when the building meets one of the specific hazard requirements in IFC 903.2.11, generally the occupied floor (30 people) over 55 feet in height requirement.

The State of New York has required the installation of automatic sprinkler systems in all buildings over 30 feet in height for the past 10 years. A majority of that reasoning is to require business and educational occupancies to have an automatic sprinkler system for buildings over 3 stories. The reasoning for this lower height for sprinkler protection is due to the following:

1. Firefighting operations on higher levels is increasing challenging. The IFC already implicitly recognizes the extra challenges by requiring standpipe systems at the 30 feet or more height measurement as well as aerial apparatus access roads (in Appendix D). With the excellent performance of automatic sprinkler systems, the hazards to firefighters is greatly reduced.
2. Group B occupancies create a fire control problem by a majority of floor spaces being open. With the change of the materials used to construct furnishings, smoke produces a greater obscuration of the environment and makes finding the source of the fire more difficult. Other open space floor plan occupancies, such as Group M and F-1 occupancies, already have sprinkler thresholds for buildings above three stories.
3. Group B occupancies are not required to have any automatic fire alarm or detection requirements. The requirement for automatic sprinkler systems to be monitored provides a system to give accelerated warning of a fire within the building , evacuates the area and starts first responders to the scene.
4. In 2011, a Fire Captain in Asheville, North Carolina died while operating on an upper floor of a mid-rise office building that was not sprinkler protected. Several crew members, including the deceased, ran out of breathing air which was attributed to the need for utilizing air during the stair ascent. An automatic sprinkler systems would have allowed firefighters, at a minimum, to not encounter such heavy smoke conditions on lower floors during entry and allow for their air supply to be more adequate for fire attack operations. Information on this fire an recommendations for the installation of fire suppression systems in these occupancies is found in the NIOSH firefighter fatality report # F2011-18.

Over the past 10 years, the State of New York has not been petitioned to omit the sprinkler system on the new construction of mid-rise office buildings (3-7 stories). Many find that the sprinkler system allows for the use of a Class 1 standpipe system. NFPA 14, the referenced standard for standpipe system installation, permits Class 1 standpipes to be of manual wet design. This allows a building with a marginal water supply to use either street pressure or a smaller fire pump to run the sprinkler system and allow the FD to pump the pressures required to the standpipe. Without the sprinkler system, the building is responsible for providing at least 100 psi for at least 750 GPM of flow (2 stairways minimum).

This proposal is submitted with the endorsement of the New York State Building Officials Conference, the New York State Fire Marshals and Inspectors Association, and the Association of Fire Districts of New York State.

Cost Impact: This proposal will add costs to the construction of 4 to 6 story buildings that are not already using sprinklers for a 'tradeoff' of other code requirements. Cost savings may be achieved by not requiring an automatic Class III standpipe, but a manual Class I standpipe.

903.2.2 (NEW)-F-NICHOLS

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The proposal to add sprinklers for Group B occupancies more than 3 stories above grade plane was seen as overly restrictive. Section 903.2.11.3 already requires buildings with floor levels with an occupant load of 30 or more that are located 55 feet or more above the lowest level of fire department vehicle access to have an automatic sprinkler system. This was felt to be an adequate requirement. Also, loss data to support this requirement were not presented.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Daniel E. Nichols, requests Approval as Submitted.

Commenter's Reason: In Dallas, the comments asking for disapproval of this code change proposal mainly included validation of the need by fire reports as well as the reliance of the 55 foot sprinkler requirement for almost every use group.

As it applies to fire reporting, the NFPA report "U.S. Structure Fires in Office Properties" (November 2010) reports that only 20% of fires in office buildings occur during normally closed hours (10p-7a) but constitute 55% of direct property damage, or $59.4 million over 5 years. Further, 19% of fires occurred on weekends but constituted 30% of associated property loss. Even in the executive summary, "These findings highlight the need for automatic detection and extinguishing equipment to protect these properties when they aren't occupied."

To correlate these findings with the original proposal- firefighting in upper floors of buildings is more hazardous than operating on grade level due to the need to use interior stairways to advance handlines and the need for the use of ladders for rescue, entry, and ventilation. Even though the IFC requires the installation of a standpipe system for buildings greater than 30 feet in height, providing an automatic sprinkler system in Group B occupancies when the building hits 4 stories is needed to address the need for fire control and safer firefighting operations in an occupancy with a record of damage in off-hours. The record of the buildings having a low civilian causality rate is noted; but doesn't provide to the needs of firefighters (as described in the original proposal).

To the use of the 55 foot requirement to handle sprinkler coverage, this proposal was submitted using identical language found for Group F-1, M, and S-1 occupancies as it relates to building height (above 3 stories). The fire area square footage requirements were not carried over since the proposal is not based on control areas, but firefighter access to upper levels. With the fire statistics seen in the NFPA report in office properties, it seems appropriate that a Group B is more like an A, F-1, M, and S-1 (all require sprinklers at 4 stories) rather than noncombustible fabrication and storage facilities.

F125-13
Final Action: AS AM AMPC____ D

F126-13
903.2.4, 903.2.7, 903.2.9

Proposed Change as Submitted

Proponent: Steve Thomas, Colorado Code Consulting, LLC representing self (sthomas@coloradocode.net)

Revise as follows:

903.2.4 Group F-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 fire area exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. ~~A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).~~

903.2.7 Group M. An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M fire area exceeds 12,000 square feet (1115 m2).
2. A Group M fire area is located more than three stories above grade plane.
3. The combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. ~~A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).~~

903.2.9 Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m^2).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group S-1 fire area used for the storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m^2).
5. ~~A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).~~

Reason: The original proponent offered no technical justification in the original proposal. The fire event that was used to support the original emotional proposal was located in a building that was 59,000 square feet in area. It was not provided with fire sprinklers. The code currently requires that this size building be provided with fire sprinklers. Previous legacy codes have also required fire sprinklers in this size building. This requirement is over-restrictive and should be removed from the code.

When the provisions were revised in the 2012 IFC, the revision was not tied to FIRE AREA, but instead was based on some area of the upholstered furniture and mattresses. It is not clear how the areas are measured. Is it the area of the space, display or building that requires the fire sprinklers? This vague language makes enforcement more difficult.

The second issue is that the provisions in these sections conflicts with provision in Section 3206.2 for high piled combustible storage (HPCS). It creates a loophole because the IFC high piled combustible storage provisions set an area threshold of 500 square feet when the height of mattress storage is > 6 feet in a public-accessible area. The provision for Group M occupancies for upholstered mattresses and furniture sets an occupancy area threshold of 5,000 square feet. The committee wasn't thinking about HPCS when they considered the proposal and it was further amended on the floor.

Finally, loss history has never been presented substantiating why upholstered furniture and mattresses warrant a different threshold for sprinkler protection.

Cost Impact: This will reduce the cost of construction.

903.2.4-F-THOMAS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The justification to remove the requirements for sprinklers where upholstered furniture is manufactured, stored and displayed was not seen as adequate. It was noted that although the building in Charleston should have been sprinklered previous to these requirements being implemented into the IFC that the current requirements were still necessary. The hazard of upholstered furniture was equated to being similar to that of hazardous materials. One concern raised regarding the current requirements was an example of a smaller store just over 5000 square feet that displays one or two upholstered chairs.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

903.2.4 Group F-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 fire area exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group F-1 occupancy where the floor area used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).

903.2.7 Group M. An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M fire area exceeds 12,000 square feet (1115 m2).
2. A Group M fire area is located more than three stories above grade plane.
3. The combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group M occupancy where the floor area used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m^2).

903.2.9 Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m^2).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group S-1 fire area used for the storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m^2).
5. A Group S-1 occupancy where the floor area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).

Commenter's Reason: It was obvious that the committee and the opposition felt that it was important to provide sprinklers in occupancies that contain upholstered furniture and mattresses. Therefore, this public comment makes the language clearer to understand the intent of the requirement. The current language is confusing. It is not clear what the area includes. In discussion with staff and other people involved in this change, the intent is to require sprinklers when the floor area of the actual material exceeds the threshold. The proposed language clarifies this and agrees with the interpretation of ICC.

Public Comment 2:

Gary Lampella, City of Redmond, representing Oregon Building Officials Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

903.2.7 Group M. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group M *fire area* is located more than three stories above grade plane.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. ~~A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m2).~~

903.2.7.1 Display and sale of upholstered furniture or mattresses. An automatic sprinkler system shall be provided throughout the fire area of a Group M occupancy used for the display and sale of upholstered furniture or mattresses where the fire area exceeds 5,000 square feet (464 m^2).

Commenter's Reason: The current code as written is overly restrictive. We understand the hazards faced by first responders but the current text would require the entire building that contained an M occupancy exceeding 5,000 square feet that had any amount of upholstered furniture or mattresses to be fully sprinkled. This include an M occupancies that had one chair or one mattress displayed for sale. Properly designed and constructed fire-resistive assemblies have proven to be very effective in controlling fire spread and smoke. The code requires in Section 901.7 that in order reduce the fire area below the limits for fire protection you have to comply with Section 707.3.9. This would require a minimum 2-hour fire barriers or horizontal assemblies for an M occupancy. Limiting M occupancies to a maximum fire area of 5,000 of a fire area with 2-hour assemblies will provide the safety features needed for this type of commodity. The NIST fire report which these sprinkler requirements were based detailed the fire spread though different parts of the building that would not have occurred if 2-hour fire barriers had been present. Tying the requirement to fire area instead of the whole building approach lessens the impact on adjoining existing occupancies without reducing the level of protection for upholstered furniture and mattresses.

Public Comment 3:

Gary Lampella, City of Redmond, representing Oregon Building Officials Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

903.2.4 Group F-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 fire area exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. ~~A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m2).~~

903.2.4.3 Group F-1 manufacture of upholstered furniture or mattresses. An automatic sprinkler system shall be provided throughout the fire area of a Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses where the fire area exceeds 2,500 square feet (232 m^2).

(Renumber following section.)

Commenter's Reason: The current code as written is overly restrictive. We understand the hazards faced by first responders but the current text would require the entire building that contained an F-1 occupancy exceeding 2,500 square feet that had any amount of upholstered furniture or mattresses being manufactured to be fully sprinkled. This includes F-1 occupancies that had one chair or one mattress being manufactured. Properly designed and constructed fire-resistive assemblies have proven to be very effective in controlling fire spread and smoke. The code requires in Section 901.7 that in order reduce the fire area below the limits for fire protection you have to comply with Section 707.3.9. This would require a minimum 3-hour fire barriers or horizontal assemblies for an F-1 occupancy. Limiting F-1 occupancies to a maximum fire area of 2,500 of a fire area with 3-hour assemblies will provide the safety features needed for this type of commodity. The NIST fire report which these sprinkler requirements were based detailed the fire spread though different parts of the building that would not have occurred if 3-hour fire barriers had been present. Tying the requirement to fire area instead of the whole building approach lessens the impact on adjoining existing occupancies without reducing the level of protection for upholstered furniture and mattresses.

Public Comment 4:

Gary Lampella, City of Redmond, representing Oregon Building Officials Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

903.2.9 Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m^2).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group S-1 fire area used for the storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m^2).
5. ~~A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).~~

<u>**903.2.9.1 Storage of upholstered furniture or mattresses.** An automatic sprinkler system shall be provided throughout the fire area of a Group S-1 occupancy used for the storage of upholstered furniture or mattresses where the fire area exceeds 2,500 square feet (232 m^2).</u>

(Renumber following sections.)

Commenter's Reason: The current code as written is overly restrictive. We understand the hazards faced by first responders but the current text would require the entire building that contained an S-1 occupancy exceeding 2,500 square feet that had any amount of upholstered furniture or mattresses being stored to be fully sprinkled. This includes S-1 occupancies that had one chair or one mattress being stored. Properly designed and constructed fire-resistive assemblies have proven to be very effective in controlling fire spread and smoke. The code requires in Section 901.7 that in order reduce the fire area below the limits for fire protection you have to comply with Section 707.3.9. This would require a minimum 3-hour fire barriers or horizontal assemblies for an S-1 occupancy. Limiting S-1 occupancies to a maximum fire area of 2,500 of a fire area with 3-hour assemblies will provide the safety features needed for this type of commodity. The NIST fire report which these sprinkler requirements were based detailed the fire spread though different parts of the building that would not have occurred if 3-hour fire barriers had been present. Tying the requirement to fire area instead of the whole building approach lessens the impact on adjoining existing occupancies without reducing the level of protection for upholstered furniture and mattresses.

F126-13

Final Action: AS AM AMPC____ D

F127-13

903.2.5.2 (New) [IBC [F] 903.2.5.2] (New) 903.2.5.2.1 (New) [IBC [F] 903.2.5.2.1 (New)] 903.2.5.2.2 (New) [IBC [F] 903.2.5.2.2 (New)]

Proposed Change as Submitted

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Add new text as follows:

903.2.5.2 (IBC [F] 903.2.5.2) Group H-3 Bulk storage of distilled spirits. Automatic Sprinkler system requirements for bulk storage of distilled spirits in wooden barrels and casks shall be in accordance with Sections 903.2.5.2.1 and 903.2.5.2.2.

903.2.5.2.1 (IBC [F] 903.2.5.2.1) Ceiling sprinklers. Distilled spirits stored in wooden barrels and casks in H-3 fire areas shall be protected with ceiling sprinklers in accordance with the requirements for relieving-style metal containers in NFPA 30 for the following storage configurations

1. Double-row racks with a load depth of no more than 3 barrels per row on each rack and 10 feet or less in height, or
2. Single-row racks with no more than 4 barrels per row, and 10 feet or less in height

903.2.5.2.2 (IBC [F] 903.2.5.2.2) Engineered systems. An approved engineered automatic sprinkler system design or an automatic sprinkler system in accordance with other nationally-recognized standards or recommended practices acceptable to the *fire code official* is required for bulk storage of distilled spirits stored in wooden barrels and casks in Group H-3 fire areas for any of the following storage configurations.

1. Storage in multi-row racks with three or more rows of racks
2. The number of barrels or casks per row exceeds that specified in Section 903.2.5.2.1.
3. Storage height Greater than 10 feet.

(Renumber subsequent sections)

Reason: There is confusion about the applicability of flammable liquid (Chapter 57) and hazardous materials (Chapter 50) provisions to distilled spirits because of the exceptions for distilled spirits and wines stored in wooden barrels and casks in IFC Chapters 50 and 57 (and NFPA 30). The issue arises because of the growing popularity of "boutique" or "craft" distillers locating their operations in urban areas. The proposed language clarifies bulk storage provisions for distilled spirits but does not alter the intent. The proposed language does not affect provisions applicable to use, nor those applicable to liquor storage in retail or wholesale establishments.

First, note distilled spirits are Class 1C and Class 1B flammable liquids. They are primarily comprised of ethyl alcohol (ethanol) and water with concentrations ranging from approximately 19% to 99%. The boiling point of pure ethanol is approximately 178ºF so an ethanol mixture with water will boil between 178ºF and 212ºF. The closed cup flash point for a 19% concentration of ethanol in water is 100ºF and for a 58% concentration is 73ºF making the mixtures in this range Class 1C flammable liquids (these values are not adjusted for altitude). Ethanol concentrations in water between 58% and 99% are Class 1B flammable liquids.

Second, the Building Code establishes occupancy. If a quantity of a Class 1B or Class 1C flammable liquid exceeding the maximum allowable quantity (MAQ), the room in which it is located is an H3 Occupancy. Please remember this applies to bulk storage (casks, barrels, metal containers, etc. exceeding 1.3 gallon capacities) and not liquor stores and wholesale distributors for which there are several exceptions.

Third, H occupancies have to be sprinklered. The sprinklering requirements for flammable and combustible liquids are outside the scope of NFPA 13. NFPA 13 points to NFPA 30 (Flammable and Combustible Liquids Code) for detailed requirements. Ethanol stored in any container larger than those excepted for retail – other than wood – is addressed there.

This is not because wood is inherently safer than metal, plastic or glass – it is not. It was probably inserted in the legacy code(s) back when casks were stored in liquid storage warehouses separated by hundreds of feet from one another and urban distilleries weren't contemplated. It was probably held over today because there is not yet an established sprinkler criteria for the storage of Class 1C flammable liquids in wooden barrels and casks. THIS HOWEVER DOES NOT MEAN THESE ROOMS SHOULD BE EXEMPT FROM SPRINKLERING REQUIREMENTS!

Fourth, there is no established sprinkler criteria for flammable and combustible liquids stored in wood casks. The modification proposed to Section 903.2.5.2 provides a baseline sprinkler criteria for distilled spirit storage quantities over the Class 1C flammable liquid MAQ, up to 10 feet in height, 2 racks (flu space) with 3 barrels per row in each rack, or single rack with 4 barrels per row. An engineered sprinkler design is required for quantities over the MAQ stored in a manner that exceeds any of these parameters. The language allows the fire code official the latitude to accept published recommended industry practices in lieu of an engineered design or test.

Relieving-style containers are identified because the wooden barrels and casks will release their contents when exposed to fire as the metal bands expand and the staves separate. Metal is identified because plastic and glass are much more vulnerable than wood. Ten foot height is identified as this envelopes the maximum storage heights of wooden barrels and casks typically seen in craft distilleries and is well below the 25 foot storage height permitted in NFPA 30 for relieving-style metal containers.

Last, please note that except for establishing a baseline sprinkler design criteria, the applicable code requirements have not been changed.

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

903.2.5.2-F-EMERICK

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal was disapproved based upon the proponent's request. This request by the proponent was related to the need to correlate with F285-13.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brad Emerick, Denver Fire Department, representing Fire Marshal's Association of Colorado (FMAC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

903.2.5.2 (IBC [F] 903.2.5.2) Group H-3 Bulk storage of distilled spirits in wooden barrels and casks. The bulk storage of distilled spirits in wooden barrels and casks shall be protected by an engineered automatic sprinkler system or by a sprinkler system designed in accordance with nationally-recognized standards or recommended practices acceptable to the *fire code official*: ~~Automatic Sprinkler system requirements for bulk storage of distilled spirits in wooden barrels and casks shall be in accordance with Sections 903.2.5.2.1 and 903.2.5.2.2.~~ Automatic sprinkler protection in accordance with NFPA 30 for relieving style metal containers shall be considered to comply with the requirements of this section for the following configurations.

1. Double-row racks with a load depth of no more than 3 barrels per row on each rack and 10 feet or less in height, or
2. Single-row racks with no more than 4 barrels per row, and 10 feet or less in height

~~**903.2.5.2.1 (IBC [F] 903.2.5.2.1) Ceiling sprinklers.** Distilled spirits stored in wooden barrels and casks in H-3 fire areas shall be protected with ceiling sprinklers in accordance with the requirements for relieving-style metal containers in NFPA 30 for the following storage configurations~~

~~1. Double-row racks with a load depth of no more than 3 barrels per row on each rack and 10 feet or less in height, or~~
~~2. Single-row racks with no more than 4 barrels per row, and 10 feet or less in height~~

~~**903.2.5.2.2 (IBC [F] 903.2.5.2.2) Engineered systems.** An approved engineered automatic sprinkler system design is required for bulk storage of distilled spirits stored in wooden barrels and casks in Group H-3 fire areas for any of the following storage configurations.~~

~~1. Storage in multi-row racks with three or more rows of racks~~
~~2. The number of barrels or casks per row exceeds that specified in Section 903.2.5.2.1.~~
~~3. Storage height Greater than 10 feet.~~

Commenter's Reason: The issue arises because of the growing popularity of "boutique" or "craft" distillers locating their operations in urban areas. Because there is no established sprinkler criteria for flammable and combustible liquids stored in wooden barrels and casks, the codes require an engineered design for the sprinkler protection in H3 fire areas regardless of the size operation (explanation below*****). But the quantity, storage volume, and storage height typically used in micro-distilleries typically do not present the hazard of large-scale operations. The proposed language specifies small-scale storage configurations where an “off the shelf” sprinkler design detailed per NFPA 30 may be used so the operators are not required to hire an engineer or have tests conducted in order to open their operations. The proposed language does not affect provisions applicable to use, dispensing or handling, or those applicable to liquor storage in retail or wholesale establishments.

The proposed language provides a sprinkler design criteria for distilled spirit storage quantities in excess of the Class 1B/1C flammable liquid MAQ, up to 10 feet in height. Either a 2 racks (flu space) with 3 barrels per row in each rack, or single rack with 4 barrels per row would be permitted. An engineered sprinkler design is required for any storage configuration that exceeds any of these parameters. The language allows an engineered design to be accepted in any case and also provides the fire code official latitude to accept published recommended industry practices in lieu of an engineered design or test.

Relieving-style containers are identified because the wooden barrels and casks will release their contents when exposed to fire as the metal bands expand and the staves separate. Metal is identified because plastic and glass are much more vulnerable than wood and the corresponding sprinkler criteria is too conservative. A 10’ height is identified as this envelopes the maximum storage heights of wooden barrels and casks typically seen in craft distilleries while well below the 25’ storage height permitted in NFPA 30 for relieving-style metal containers.

***Explanation for an engineered sprinkler design:**
There is confusion about the applicability of flammable liquid (Chapter 57), hazardous materials (Chapter 50), and NFPA 30 provisions to distilled spirits because of the exceptions for distilled spirits and wines stored in wooden barrels and casks contained therein.

First, note ethanol/water mixtures ranging from approximately 19% concentration of alcohol by volume (ABV) to pure ethanol (100% ABV) are Class 1C and Class 1B flammable liquids. Ethanol/water mixtures will boil between 178^{0}F and 212^{0}F at sea level. The closed cup flash point for a 19% concentration of ethanol in water is 100^{0}F and for a 58% concentration is 73^{0}F making the mixtures in this range Class 1C flammable liquids. Ethanol concentrations in water between 58% and 100% are Class 1B flammable liquids. These values are not adjusted for altitude.

Second, the Building Code establishes occupancy. If a quantity of a Class 1B or Class 1C flammable liquid exceeds the maximum allowable quantity (MAQ), the room in which it is located is an H3 Occupancy. Please remember this applies to bulk storage (casks, barrels, metal containers, etc. exceeding 1.3 gallon capacities) and not to liquor stores and wholesale distributors for which there are several exceptions.

Third, H occupancies have to be sprinklered. The sprinklering requirements for flammable and combustible liquids are outside the scope of NFPA 13. NFPA 13 points to NFPA 30 (Flammable and Combustible Liquids Code) for detailed requirements. Ethanol stored in any container larger than those exempted for retail – other than wood – is addressed there. This is not because wood is inherently safer than metal, plastic or glass – it is not. It is because there is not yet an established sprinkler criteria for the storage of Class 1B and 1C flammable liquids in wooden barrels and casks. THIS HOWEVER DOES NOT MEAN THESE ROOMS SHOULD BE EXEMPT FROM SPRINKLERING REQUIREMENTS!

Fourth, please note that except for establishing a baseline sprinkler design criteria, the applicable code requirements have not been changed.

F127-13
Final Action: AS AM AMPC____ D

F131-13
903.2.11.3 (IBC [F] 903.2.11.3)

Proposed Change as Submitted

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Revise as follows:

903.2.11.3 (IBC [F] 903.2.11.3) Buildings 55 feet or more in height. An automatic sprinkler system <u>in accordance with Section 903.3.1.1</u> shall be installed throughout buildings with a floor level having an occupant load of 30 or more that is located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access.

Exceptions:

1. Airport control towers.
2. Open parking structures.
3. Occupancies in Group F-2.

Reason: This proposal revises the language to specify a NFPA 13 sprinkler system is required in buildings meeting the height criteria. The proposed change only affects residential buildings on sloping sites where the lowest level of fire department vehicle access is significantly below grade plane. It has no other effect on sprinkler requirements related to the height of a building, namely IBC Section 540.2 which permits NFPA 13R sprinkler systems in residential buildings up to 60 feet in height – measured to the roof from grade plane (vs. lowest level of FD vehicle access).

If the lowest level of fire department vehicle access is at grade plane or on the high-elevation side of a sloping site, and the building height with respect to grade plane is 60 feet, then the highest occupied floor will be 10+ feet below this at a height of 50 feet or less – but below "55 feet to the highest occupied floor" in either case. Per IBC Section 540.2, a 13R sprinkler system is still permitted.

On a sloping site, where the lowest level of fire department vehicle access is on the low-elevation side of the site, firefighters are presented a building face taller in stories and feet than the nominal height of the building. If this face is tall enough that the highest occupied floor is 55 feet above them, the additional protection afforded by an NFPA 13 sprinkler system- especially with combustible construction – is warranted.

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

903.2.11.3-F-EMERICK

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

903.2.11.3 (IBC [F] 903.2.11.3) Buildings 55 feet or more in height. An automatic sprinkler system ~~in accordance with Section 903.3.1.1~~ shall be installed throughout buildings <u>that have one or more stories</u> with ~~a floor level having~~ an occupant load of 30 or more ~~that is~~ located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access<u>, measured to the finished floor</u>.

Exceptions:

1. Airport control towers.
2. Open parking structures.
3. Occupancies in Group F-2.

Committee Reason: This proposal was approved as it helps to clarify how the height of the building is to be measured to determine whether a sprinkler system is required and through the modification the specific requirement for a NFPA 13 system was removed. There are likely very few situations that an NFPA 13R system would be applicable and the justification to restrict the type of sprinkler systems to NFPA 13 was not provided. The modification further clarifies that the measurement is taken to the finished floor level and not to the ceiling of the story.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brad Emerick, Denver Fire Department, representing Fire Marshal's Association of Colorado (FMAC), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.2.11.3 (IBC [F] 903.2.11.3) Buildings 55 feet or more in height. An automatic sprinkler system in accordance with Section 903.3.1.1 shall be installed throughout buildings that have one or more stories with an occupant load of 30 or more located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access, measured to the finished floor.

Exceptions:

1. Open parking structures.
2. Occupancies in Group F-2.

Commenter's Reason: The intent of this proposal is specifying an NFPA 13 sprinkler system in residential buildings that fall into the gap between the way heights are regulated in the codes; i.e., where a building is 60' or less in height above grade plane, but has an occupied floor more than 55' above the lowest level of fire department vehicle access (see figure).

Multi-story residential buildings 60' or less in height (measured from grade plane to the roof) are permitted to be sprinklered with an NFPA 13R system (Bldg 1 in figure).

However, such a building on a sloping site where the lowest level of fire department vehicle access is on the low side of the site, presents firefighters a building face taller than 60' (Bldg 2 in figure).

If this face is so tall that the highest occupied floor is 55 feet above them, the additional protection afforded by an NFPA 13 sprinkler system is warranted – especially since the top 4 stories of these buildings are now permitted to be combustible construction.

Notes:

[1] the proposal only affects residential buildings exceeding the height criteria as a non-residential buildings are required to be sprinklered with NFPA 13 systems.

[2] the proposal only affects multi-story residential buildings on sloping sites where the lowest level of fire department vehicle access in on the low side of the site. In other words, if the lowest level of fire department vehicle access to a 60'-tall residential building (measured from grade plane) is at grade plane or on the high-elevation side of a sloping site, a 13R sprinkler system is permitted.

[3] The issue arises because of the difference in the two ways building height is regulated; i.e.:
Height 1: average grade elevation around the perimeter of the building (grade plane) up to the average roof elevation, and
Height 2: lowest level of fire department vehicle access up to the highest occupied floor.

F131-13

Final Action: AS AM AMPC____ D

F133-13

903.3.1.1 (IBC [F] 903.3.1.1), 903.3.1.1.2 (New) [IBC [F] 903.3.1.1.2]

Proposed Change as Submitted

Proponent: Marshall Klein, International Code Consultants, representing Multi Housing Council

Revise as follows:

903.3.1.1 (IBC [F] 903.3.1.1) NFPA 13 sprinkler systems. Where the provisions of this code require that a building or portion thereof be equipped throughout with an automatic sprinkler system in accordance with this section, sprinklers shall be installed throughout in accordance with NFPA 13 except as provided in Sections 903.3.1.1.1 and 903.3.1.1.2.

903.3.1.1.2 (IBC [F] 903.3.1.1.2) Bathrooms. In Group R occupancies, other than Group R residential care facilities, sprinklers shall not be required in bathrooms that do not exceed 55 square feet in area and are located within individual dwelling units or sleeping units, provided that walls and ceilings, including the walls and ceilings behind any shower enclosure or tub, are of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating.

Reason: This change is necessary to reinstate an exception that has been in existence since 1976 but was nevertheless deleted from the 2013 edition of NFPA 13 with no technical justification. Because the 2015 I-codes will reference the 2013 edition of NFPA 13, it is necessary and appropriate for the IBC and IFC to reverse NFPA's unsupported action on this issue.

Although reinstating the small bathroom exception will have a limited impact on new construction because many bathrooms exceed the 55 sq. ft. area limit in the exception to accommodate wheelchair access, the more important consequence will be removing an unnecessary cost increase for building owners who choose to retrofit existing properties with small bathrooms that were built before it was common to provide wheelchair access. Codes and standards should not erect any unnecessary barriers to retrofitting sprinklers into existing properties, such as existing high-rise buildings.

Background: In the 1976 edition of the Life Safety Code, to encourage cost effective fire protection systems for apartment buildings, NFPA 101 Section 11-3.8.3.4.1 provided an exception to permit bathrooms that did not exceed 55 sq. ft within individual dwelling units to omit sprinklers when the apartment building was sprinklered in accordance with NFPA 13. The basis of the 55 sq. ft. area is that this area accommodates a "typical" small bathroom that contains a standard tub, a toilet and a sink…nothing more. This exception was later duplicated from NFPA 101 into the 1991 edition of NFPA 13 with the understanding that the next edition of NFPA 101 (1994) could delete the exception since NFPA 13 would have it covered. NFPA 101-1994 then, as planned, deleted the exception.

The situation remained "status quo" until the cycle that produced the 2010 edition of NFPA 13. A proposal to delete the bathroom exception for apartments was initially rejected by the NFPA 13 Committee during the ROP process (Code Proposal 13-202 Log #79) with the Committee Statement for rejection as "No technical data was provided supporting this change". During the ROC process, a public comment (Comment 13-141 Log #235) was submitted by the National Fire Sprinkler Association (NFSA), and the NFPA 13 Committee reversed itself by accepting the Comment, even though no new technical information had been provided. Nevertheless, the NFPA membership rejected this revision at NFPA's annual conference, and the 2010 edition of NFPA 13 retained the exception.

During the 2013 edition cycle for NFPA 13, the issue was raised again, and this time, still with no technical justification, NFPA accepted the change. As a result, NFPA 13-2013 (Section 8.15.8.1.1) only allows omission of sprinklers from in bathrooms in hotels and motels, not apartments.

The history of apartment unit bathroom fires is statistically minimal. According to the recent NFPA Home Structure Fire Report, January 2009, Table 9B, "Reported Apartment Structure Fires by Area of Origin 2003-2006 Annual Averages", out of 113,000 fires/year, only 1600 (1%) are in bathrooms. Given that we have more than 35 years of experience with the bathroom sprinkler exception being in place (since it was put into NFPA 101 in 1976), one would certainly expect anecdotal or statistical experience to indicate the existence of a problem, if there were one. On the contrary, apartments have consistently rank at the top of the list with respect to sprinkler reliability and performance statistics, and no statistical (or other) evidence was presented to or by the NFPA 13 committee to justify deletion of the bathroom sprinkler exception for apartments.

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

903.3.1.1-F-KLEIN

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

903.3.1.1 (IBC [F] 903.3.1.1) NFPA 13 sprinkler systems. Where the provisions of this code require that a building or portion thereof be equipped throughout with an automatic sprinkler system in accordance with this section, sprinklers shall be installed throughout in accordance with NFPA 13 except as provided in Sections 903.3.1.1.1 and 903.3.1.1.2.

903.3.1.1.2 (IBC [F] 903.3.1.1.2) Bathrooms. In Group R occupancies, other than Group R-4 occupancies ~~Group R residential care facilities~~, sprinklers shall not be required in bathrooms that do not exceed 55 square feet in area and are located within individual dwelling units or sleeping units, provided that walls and ceilings, including the walls and ceilings behind any shower enclosure or tub, are of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating.

Committee Reason: The exception for bathrooms has been deleted in the 2013 edition of NFPA 13 with no technical justification. Therefore, to retain this exception for use with the IFC and IBC it is necessary to add a new section 903.3.1.1.2. In addition it was a concern that this particular allowance should be within the IBC and IFC as often the architects miss the 15 minute thermal barrier requirement that NFPA 13 requires. The modification simply replaces “Group R residential care facility” with the proper I-Code occupancy terminology Group R-4.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.3.1.1.2 (IBC [F] 903.3.1.1.2) Bathrooms. In Group R occupancies, ~~other than Group R-4 occupancies,~~ sprinklers shall not be required in bathrooms that do not exceed 55 square feet in area and are located within individual dwelling units or sleeping units, provided that walls and ceilings, including the walls and ceilings behind any shower enclosure or tub, are of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating.

Reason: The Group R-4 is limited to 16 occupants capable or self-preservation, therefore, the chance that they would need a NFPA 13 system (i.e., 5 stories or taller) is very limited. In addition, the Fair Housing Act, requires that group homes be treated the same as any other congregate residence. Therefore, the language shown struck should be removed. The Group R-4 occupancy should have the same allowance for these small bathrooms as all other Group R occupancies. There is very minimal fire hazards in this area.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

F133-13

Final Action: AS AM AMPC____ D

F135-13
903.3.1.2 (IBC [F] 903.3.1.2)

Proposed Change as Submitted

Proponent: Tim Pate, City and County of Broomfield, CO, representing Colorado Chapter Code Change Committee

Revise as follows:

903.3.1.2 (IBC [F] 903.3.1.2) NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies up to and including four stories ~~in height~~ <u>above grade plane</u> shall be permitted to be installed throughout in accordance with NFPA 13R.

> <u>**Exception:** The number of stories of Group R occupancies constructed in accordance with Section 510.2 and 510.4 of the International Building Code shall be measured from the horizontal assembly creating separate buildings.</u>

Reason: There has been confusion as to where you measure the four story limitation for NFPA 13R sprinkler systems. This proposal clarifies the intent of NFPA 13R limitations by using the correct language for building height and addressing the use of these systems in podium buildings.

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

903.3.1.2-F-PATE

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

903.3.1.2 (IBC [F] 903.3.1.2) NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies up to and including four stories <u>in height</u> ~~above grade plane~~ shall be permitted to be installed throughout in accordance with NFPA 13R.

> ~~**Exception:**~~ The number of stories of Group R occupancies constructed in accordance with Section 510.2 and 510.4 of the International Building Code shall be measured from the horizontal assembly creating separate buildings.

Committee Reason: This proposal was approved as it addresses the scenario where NFPA 13R systems are desired to be installed on residential buildings using the podium building allowance in Section 510.2 and 510.4 of the IBC. The modification clarifies that the number of stories in height is not related to grade plane. In addition the exception was revised to be part of the main section as the provisions of the exception are merely clarification of the application of the provisions in Section 510.2 and 510.4. The committee made it clear that it was not their intention to override the action taken on F134-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brad Emerick, Denver Fire Department, representing Fire Marshal's Association of Colorado (FMAC), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.3.1.2 (IBC [F] 903.3.1.2) NFPA 13R sprinkler systems. *Automatic sprinkler systems* <u>in accordance with NFPA 13R shall be permitted to be installed throughout</u> ~~in~~ Group R occupancies <u>in buildings</u> up to and including four stories <u>and 60 feet</u> in height <u>above</u>

grade plane~~ shall be permitted to be installed throughout in accordance with NFPA 13R~~. ~~The number of stories of Group R occupancies constructed in accordance with Section 510.2 and 510.4 of the *International Building Code* shall be measured from the horizontal assembly creating separate buildings.~~

Commenter's Reason: This proposal clarifies the intent of NFPA 13R limitations by using the correct language for building height and correlating with the NFPA 13R committee with respect to separation of buildings.

It was never the intent to recognize the horizontal 3-hour separation permitted for "pedestal-style" buildings (IBC Section 510.2) as creating separate buildings for all code requirements like a Fire Wall does. Under the applicable special provision, the overall building may be considered as two separate buildings only for the purposes of:

[1] determining area limitations,
[2] continuity of fire walls,
[3] limitation of number of stories, and
[4] type of construction.

However the overall building still has to be safe and accessible for escape and for fire department suppression, search and rescue operations.

There is a breakpoint in the codes for building heights between 30 feet above the lowest level of fire department access and four stories above grade plane. This is the point where stair enclosures have to be 2-hour rated, where at least one stair is required to extend to the roof, when standpipes are required, where emergency escape and rescue windows are no longer required, etc.

This height correlates with the upper limit at which fire departments can conduct operations using ground ladders. Hand-carried ladders can typically only reach 30 to 40 feet above the grade from where they're set. A higher degree of safety has historically been required in buildings taller than this because an offensive attack will include – maybe exclusively – internal operations.

In residential buildings, this is also the threshold where sprinkler systems are required to be more robust; i.e., where NFPA 13 systems are required.

With the relaxation in requirements for residential pedestal buildings leading to the consolidation of combustible framing (and the contents) in the highest stories, it makes no sense to also relax the sprinklering requirements for that portion of the building.

More stories means more time required for search and rescue.

Combustible construction with unprotected attics and floor/ceiling spaces means less time is provided.

Public Comment 2:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing National Multi Housing Council, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

903.3.1.2 (IBC [F] 903.3.1.2) NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies up to and including four stories in height in buildings not exceeding 60 feet in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R. The number of stories of Group R occupancies constructed in accordance with Section 510.2 and 510.4 of the International Building Code shall be measured from the horizontal assembly creating separate buildings.

Commenter's Reason: Proposals F134 and F135 both affect Section 903.3.1.2, and it was the committee's intent to have both proposals incorporated into the section. The committee report doesn't clearly reflect this, so to avoid any possible confusion with respect to what the final text should be, this comment has been prepared to merge the content of F134 into F135. If this comment is approved, it is the intent that the final action on F135 will override F134 so that the final text of the section will include all of the intended revisions. .

F135-13

Final Action: AS AM AMPC____ D

F138-13
903.3, 903.3.8 (New), 903.4 (IBC [F] 903.4), 903.3.5.1 (IBC [F] 903.3.5.1), 903.3.5.2 (IBC [F] 903.3.5.2)

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

903.3 Installation requirements. *Automatic sprinkler systems* shall be designed and installed in accordance with Sections 903.3.1 through 903.3.8~~7~~.

~~**903.3.5.1.1 Limited area sprinkler systems.**~~
~~Limited area sprinkler systems serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available. Limited area sprinkler systems connected to domestic water supplies shall comply with each of the following requirements:~~

1. ~~Valves shall not be installed between the domestic water riser control valve and the sprinklers.~~

   ~~**Exception:** An *approved* indicating control valve supervised in the open position in accordance with Section 903.4.~~

2. ~~The domestic service shall be capable of supplying the simultaneous domestic demand and the sprinkler demand required to be hydraulically calculated by NFPA 13, NFPA 13D or NFPA 13R.~~

~~903.3.5.1~~ 903.3.5.2 (IBC [F] ~~903.3.5.1~~ 903.3.5.2) Residential combination services. A single combination water supply shall be allowed provided that the domestic demand is added to the sprinkler demand as required by NFPA 13R.

903.3.8 (IBC [F] 903.3.8) Limited area sprinkler systems. Limited area sprinkler systems shall be in accordance with the standards listed in Section 903.3.1 except as provided in Sections 903.3.8.1 through 903.3.8.5.

903.3.8.1 Number of sprinklers. Limited area sprinkler systems shall not exceed 6 sprinklers in any single fire area.

903.3.8.2 Occupancy hazard classification. Only areas classified by NFPA 13 as Light Hazard or Ordinary Hazard Group 1 shall be permitted to be protected by limited area sprinkler systems.

903.3.8.3 Piping arrangement. Where a limited area sprinkler system is installed in a building with an automatic-wet standpipe system, sprinklers shall be supplied by the standpipe system. Where a limited area sprinkler system is installed in a building without a wet-pipe automatic standpipe system, water shall be permitted to be supplied by the plumbing system provided that the plumbing system is capable of simultaneously supplying domestic and sprinkler demands.

903.3.8.4 Supervision. Control valves shall not be installed between the water supply and sprinklers unless the valves are of an approved indicating type that are supervised or secured in the open position.

903.3.8.5 Calculations. Hydraulic calculations in accordance with NFPA 13 shall be provided to demonstrate that the available water flow and pressure are adequate to supply all sprinklers installed in any single fire area with discharge densities corresponding to the hazard classification.

~~903.3.5.2~~ 903.3.5.3 (IBC [F] ~~903.3.5.2~~ 903.3.5.3) Secondary water supply. An automatic secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings in Seismic Design Category C, D, E or F as determined by the *International Building Code*. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with NFPA 13.

Exception: Existing buildings.

903.4 (IBC [F] 903.4) Sprinkler system monitoring and alarms. All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised.

Exceptions:

1. Automatic sprinkler systems protecting one- and two-family dwellings.
2. Limited area systems ~~serving fewer than 20 sprinklers~~ in accordance with Section 903.3.8..

3 through 7 (*No change to current text)*

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This code section as it exists allows the protection of large areas by a system of automatic sprinklers that is not afforded the same level of protection required by NFPA standards 13, 13R and 25. Some of these include waterflow alarms, components listed for fire protection systems, fire department connections, testing and maintenance.

This code change would reduce the number of sprinklers that may be supplied from a building plumbing system to six in a single fire area to eliminate the potential for multiple limited area sprinkler systems and combined water supply demands necessary to control a single fire event.

It also limits the six sprinklers to a discharge density of Light Hazard or Ordinary Hazard Group I. The basis for these values provides coordination with longstanding requirements in NFPA 101, Life Safety Code, Section 9.7.1.2, which limits the number and discharge density of automatic sprinklers supplied from a plumbing system. Such a limit is reasonable in that it can allow for a pipe schedule design if the plumbing system is capable of satisfying the NFPA 13 pipe diameter requirements.

Cost Impact: This code change would increase the cost of construction

903.3-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal was approved as it is more reasonable to allow limited area sprinkler systems for 6 sprinklers versus 20. There was some concern that now that there are more controls associated with such systems that the number should be revised back to 20.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Emory Rodgers, VDHCO, representing self, requests Disapproval.

Commenter's Reason: Taking limited area sprinkler systems from 20 sprinkler heads to 6 based on assumptions that building officials would let owners do multiple limited area sprinkler systems, thereby allowing the owner to avoid where full sprinkler systems for the occupancy is a real stretch and to imagine that occurs frequently? Then limit area or occupancies such as A, M or B and not allow H. Only light hazards have ever been allowed.

That water lines for existing buildings could fail to supply the pressure or water volume is always possible. I can agree the calculations can support those assumptions. However, 90% of these systems are used today to allow existing buildings to be updated and renovated under the IEBC. Many limited systems use between 8 and 16 heads. Don't take away this viable and economical option to use spaces such as basements for dry storage, meat and food lockers, manger office or changing areas for employees in the A, B and M occupancies. This will force business owners to use spaces illegally without permits.

This will force small businesses to expend thousands of dollars to put in a fire line and water meter that does make the difference in the financial viability for anyone wanting to open a new small business.

Life safety and property protection is enhanced by this limited area sprinkler system that has been in the codes for decades with much success and not a lot of fire data to dispute that these limited are sprinkler systems are serving a fire safety need and a need to have light hazard storage space.

Let the proponents come back with a sensible and viable option that works for the many impacted building owners and small business stakeholders and that addresses real problems instead of seemly benefitting a few providing and installing fire systems.

Vote to overturn the committee with a simple majority and then I will introduce for denial that takes a simple majority.

F138-13

Final Action: AS AM AMPC____ D

F139-13
903.3.5.2 (IBC [F] 903.3.5.2); IBC [F] 403.3

Proposed Change as Submitted

Proponent: Jeffrey M. Hugo, CBO, representing the National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

IBC [F] 403.3 Automatic sprinkler system. Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section ~~903.3.5.2~~ 403.3.3.

~~903.3.5.2 (IBC [F] 903.3.5.2)~~ IBC [F]403.3.3 Secondary water supply. An automatic secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings assigned to Seismic Design Category C, D, E or F as determined by the International Building Code. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the automatic sprinkler system. The secondary water supply shall have a duration of not less than 30 minutes

IBC [F] ~~403.3.3~~ 403.3.4 Fire pump room. Fire pumps shall be located in rooms protected in accordance with Section 913.2.1.

Reason: Secondary water supply for high rises is in Chapter 9, whereas the requirements for high rises are in Section 403 of the *International Building Code*. Since this secondary water supply requirement only applies to high rises it is more appropriate for designers and users in Section 403.3.3 of the *International Building Code*.

Cost Impact: Will not increase the cost of construction

903.3.5.2-FS-HUGO

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The secondary water supply requirements are very specific to high rise buildings and are more appropriately located within Section 403.3 of the IBC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Hugo, CBO, representing National Fire Sprinkler Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IBC [F] 403.3 Automatic sprinkler system. Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 403.3.3.

IBC [F]403.3.3 Secondary water supply. An automatic secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings assigned to Seismic Design Category C, D, E or F as determined by the International Building Code. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the automatic sprinkler system. The secondary water supply shall have a duration of not less than 30 minutes

IBC [F] 403.3.4 Fire pump room. Fire pumps shall be located in rooms protected in accordance with Section 913.2.1.

IFC 914.3.3 Secondary water supply. An automatic secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings assigned to Seismic Design Category C, D, E or F as determined by the *International Building Code*. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with NFPA 13.

Exception: Existing buildings.

Commenter's Reason: The proposal in the Committee Action Hearings did not make the change in the IFC. This public comment moves 903.3.5.2 of the IFC to 914.3.3. Approval of this public comment would make the IBC and the IFC the same in regards to secondary water for high rise buildings.

F139-13

Final Action: AS AM AMPC____ D

F148-13
905.4

Proposed Change as Submitted

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Revise as follows:

905.4 Location of Class I standpipe hose connections. Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required interior *exit stairway*, a hose connection shall be provided for each floor level above, ~~and~~ below and at grade. Hose connections shall be located at an intermediate floor level landing between floors, unless otherwise approved by the fire code official.

2 through 6 *(No change to current text)*

Reason: Since hose connections are placed at intermediate landings between floors, it is not clear as to which floor the hose connection serves. However, by not listing "at grade" the provision could be read that one is not required to serve the floor at grade, whichever intermediate landing that might be, leading to some challenges of its meaning. Hopefully, this provides clarification.

Cost Impact: This appears to be a correction. As such, it is not an increase in cost over what the original intent of the code provision should require.

905.4-F-GODWIN

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was approved as it will require the appropriate placement of hose connections including the floor level at grade. Note that there were some concerns with terminology such as "for each floor level" that may be better addressed by language that addresses stories. However, it was noted that use of the term "story" may lose locations such as penthouses and mezzanines.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gregory R. Keith, Professional heuristic Development, representing The Boeing Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

905.4 Location of Class I standpipe hose connections. Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway*, a hose connection shall be provided for each floor level above~~,~~ and below ~~and at~~ grade plane. Hose connections shall be located at an intermediate floor level landing between floors, unless otherwise approved by the fire code official.

2 through 6 *(No change to current text)*

Commenter's Reason: The original proposal intended to clarify that the provision applied to stories at grade. Unfortunately, it modified currently incorrect terminology. "Grade" is not a defined term in the IBC/IFC. However, "grade plane" is a defined term.

Returning to the original "above and below" language and adding "plane" after "grade" solves the problem. "Grade plane" is a defined term and represents a reference datum plane. "Story above grade plane" is also a defined term. Accordingly, all stories are either above or below grade plane. If a story is precisely at grade plane, it is above grade plane, by definition. Approval of this editorial modification will bring this standpipe provision into context with current IBC/IFC definitions and intent and will provide for more consistent interpretations.

Public Comment 2:

Gregory R. Keith, Professional heuristic Development, representing The Boeing Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

905.4 Location of Class I standpipe hose connections. Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway*, a hose connection shall be provided for each story ~~floor level~~ above, below and at grade. Hose connections shall be located at an intermediate ~~floor level~~ landing between stories ~~floors~~, unless otherwise approved by the fire code official.

2 through 6 *(No change to current text)*

Commenter's Reason: When the IFC Code Committee approved this proposal, it mentioned in its reason statement, "Note that there were some concerns with terminology such as "for each floor level" that may be better addressed by language that addresses stories. "Floor" and "floor level" are not defined terms in the IBC/IFC. The term "story" is a defined term. This modification addresses that concern and uses proper terminology that will result in more consistent interpretations of this provision.

F148-13

Final Action: AS AM AMPC____ D

F149-13
905.9 (IBC [F] 905.9)

Proposed Change as Submitted

Proponent: Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

905.9 (IBC [F] 905.9) Supervision. Supervision of standpipes shall be in accordance with Sections 905.9.1 and 905.9.2.

905.9.1 (IBC [F] 905.9.1) Valve Supervision. (*unchanged*)

905.9.2 (IBC [F] 905.9.2) Manual dry standpipes. Manual dry standpipe systems shall be supervised with a minimum of 10 psig and a maximum of 40 psig air pressure and monitored by a low air pressure alarm.

Reason: Improves the integrity of such systems for utilization in a fire event, which could otherwise have all hose valves opened or develop multiple leaks without anyone knowing until such system is charged with water.

Cost Impact: The code change proposal will increase the cost of construction of such systems to install an air compressor and low air pressure alarm.

905.2-F-MORGAN

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The requirement for supervision and monitoring were felt better addressed by the maintenance requirements in NFPA 25. There was concern with how this would alert appropriate persons to a problem. The benefit to such equipment compared to the potential maintenance cost would be small. A concern was noted that if the standpipes were not being maintained in accordance with NFPA 25 the equipment as proposed would also not be maintained.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob D. Morgan, P.E., Fort Worth Fire Dept, representing Fire Advisory Board to North Central Texas Council of Governments, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

905.9 (IBC [F] 905.9) Supervision. Supervision of standpipes shall be in accordance with Sections 905.9.1 and 905.9.2.

905.9.1 (IBC [F] 905.9.1) Valve Supervision. (*unchanged*)

905.9.2 (IBC [F] 905.9.2) Manual dry standpipes. Manual dry standpipe systems shall be monitored with supervisory air pressure having a low air pressure alarm. This alarm shall have an approved exterior audible device. Where a fire alarm system is installed, actuation of the low air pressure alarm shall be monitored as a supervisory alarm. ~~supervised with a minimum of 10 psig and a maximum of 40 psig air pressure and monitored by a low air pressure alarm.~~

Commenter's Reason: The originally submitted wording has been adopted in the North Texas region for several years with great success in ensuring such dry standpipes' integrity. The primary issue addressed is vandals opening hose valves, such that the standpipe does not serve its intended purpose in a fire event when needed, resulting in significant firefighting delays, due to lack of immediate water availability. The proposal has been modified to accommodate the issues addressed in the committee's reason statement, i.e. greater specificity has been provided relative to the alarm, similar to what is provided in 903.4.2 for sprinkler waterflow alarms. Relative to the maintenance issue, most manual dry standpipes are only required to be inspected annually, with a hydro/flow test every 5 years, so if the system is leaking, it is highly probably that it could be several years before anyone is aware of such. Although there is an increased cost, please note that NFPA 14 as of the 2003 edition requires this 'supervisory air pressure' for dry standpipes where the standpipe is concealed, i.e. the requirement is not new and is becoming more common, cost effective, and widely accepted.

F149-13

Final Action: AS AM AMPC____ D

F150-13
901.8.2 (New)

<u>Proposed Change as Submitted</u>

Proponent: William Freer, New York State Office of Fire Prevention and Control (WFreer@DHSES.ny.gov)

Add new text as follows:

<u>**901.8.2 Removal of occupant use hose.** Removal of the occupant use hose line attached to a Class II standpipe system or a Class III standpipe system shall be permitted where either of the following conditions exist:</u>

1. <u>The building is equipped with a Class I standpipe system.</u>
2. <u>The building is not required to be equipped with a Class I standpipe system and the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.</u>

Reason: The current code does not require occupant use hoses in as many locations as were required in previous codes. There has been a shift in the philosophy of whether or not occupants should be asked to attempt to extinguish the fire or evacuate the structure. Most of the population is now being taught to evacuate the building, not fight the fire. This shift is mainly due to the safety risk of having a non-trained person attempting to fight a fire with more than a fire extinguisher.
Many jurisdictions have already enacted local legislation or code changes to address this issue.

The City of Philadelphia has added the following:

F-905.11 Existing buildings. Existing structures with occupied floors located more than 50 feet (15,240 mm) above or below the lowest level of fire department *vehicle* access shall be equipped with standpipes installed in accordance with Section F-905. The standpipes shall have an approved fire department connection with hose connections at each floor level above or below the lowest level of fire department *vehicle* access. **[**The fire code official is authorized to approve the installation of manual standpipe systems to achieve compliance with this section where the responding fire department is capable of providing the required fire flow at the highest standpipe outlet.**]** *These requirements shall also apply to buildings that were granted variances prior to January 1, 2004 to omit standpipes from the required exit stairways. Buildings or structures that are not in compliance with Section F-905 on the effective date of this code, shall, with written request to and upon written approval from the Fire Department, be granted three years from the effective date of this code to comply.*

Exceptions:

1. *In existing buildings having the highest occupied floors located not more than 75 feet above the lowest level of fire department vehicle access, Class I standpipe systems are permitted to be manual wet systems.*
2. *Standpipe systems installed prior to January 1, 1995 that provide a residual pressure of 65 psi (448 kPa) or greater at the highest hose outlet are exempt from the requirement to provide a residual pressure of 100 psi (690 kPa) at the highest hose outlet.*
3. *Standpipe systems with a residual pressure of less than 100 psi (690 kPa) at the topmost hose outlet are permitted where:*
   - *3.1 The building existing prior to the effective date of this code;*
   - *3.2 The building is equipped throughout with an automatic sprinkler system; and*
   - *3.3 The highest floor level is not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access,*

F-905.11.1 Removal of occupant use hoseline or Class II standpipe systems. *Removal of the hoseline attached to a Class II standpipe system or a Class III standpipe system that is not required by this code, or removal of an entire Class II standpipe system is permitted where the following conditions are met:*

1. *Removal of hoseline only: The building is equipped with a Class I standpipe system or the building is not required to have a Class I system.*
2. *Removal of the Class II standpipe system is permitted where one of the following exists:*
   - *2.1 The building is equipped throughout with an automatic fire-extinguishing system and has more than one Class I standpipe hose outlet riser in a multi-exit building or at least one riser in a single exit building;*
   - *2.2 The building is in the process of being equipped throughout with an automatic fire-extinguishing system and there is more than one standpipe hose outlet riser in a multi-exit building or there is at least one riser in a single exit building. When the sprinklers on a floor have been placed in service, the Class II standpipe*

hose stations on that floor are permitted to be removed; or

2.3 The building is not equipped throughout with an automatic fire-extinguishing system, there is more than one automatic wet Class I standpipe hose outlet riser in a multi-exit building and there is at least one automatic wet riser in a single exit building.

The City of San Francisco added:

4.09 Removal of Class II Standpipe Hose Cabinets in Sprinkler Retrofitted Buildings (PDF)

Reference: 2010 S.F.F.C. 901.8

Section 901.8 of the 2010 SFFC requires written approval from the fire code official in order to remove existing fire appliances. In order to speed the permit process, buildings subject to the San Francisco High-rise Sprinkler Ordinance will be permitted to remove Class II Standpipe hose cabinets on individual floors after they have been fully sprinklered. The applicant shall state his or her intention to remove the hose cabinets on the approved sprinkler plans.

Buildings not subject to the ordinance will continue to require written approval from the fire code official in order to remove any fire appliance. These written requests will be considered on a case-by-case basis.

Canada also allows the removal of occupant hoses but requires more signage in places where it is done.

It should also be noted that occupant use hoses are not required by NFPA 14 as follows:

1. NFPA 14--2007, Standard for the Installation of Standpipe and Hose Systems details the design and installation of standpipe systems.

7.3.4 Class III Systems. Class III systems shall be provided with hose connections as required for both Class I and Class II systems.

7.3.4.1 Where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to Four Stories in Height, Class II hose stations for use by trained personnel shall not be required, subject to the approval of the local fire department, provided that each Class I hose connection is 2 1/2 in. and is equipped with a 2 1/2 in. × 1 1/2 in. reducer and a cap attached with a chain.

This code change would not increase the cost of construction but would decrease the cost of maintenance and upkeep.

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

905.11 (NEW)-F-FREER

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Substitute the proposal as follows:

<u>**901.8.2 Removal of occupant use hose.** The fire code official is authorized to permit the removal of existing 1 ½- inch (38 mm) hose lines where the following conditions exist:</u>

1. <u>The current fire and building codes do not require their placement and</u>
2. <u>The fire code official determines that the 1 ½ -inch (38 mm) hose line will not be utilized by the trained personnel or the fire department.</u>

Committee Reason: The committee approved the proposal to address the concern that it is often necessary to remove occupant use hose but no authority is provided. However, the proposal as initially written took the authority away from the fire code official to determine. The proposed modification places that authority back but provides them with the necessary tool to allow the removal of hose lines that are not required and that will not be used by the building occupants.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

901.8.2 Removal of <u>existing</u> occupant-use hose <u>lines</u>. The *fire code official* is authorized to permit the removal of existing ~~1 ½-inch (38 mm)~~ <u>occupant-use</u> hose lines where <u>all of</u> the following conditions exist:

1. <u>Installation is not required by the current *International Fire Code* or *International Building Code*</u> ~~The current fire and building codes do not require their placement and~~
2. The ~~fire code official determines that the 1 ½ -inch (38 mm)~~ hose line<u>s</u> will not be utilized by ~~the~~ trained personnel or the fire department.
3. <u>The remaining outlets are compatible with local fire department fittings.</u>

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

The committee approved F150-13 at the hearings in Dallas with modification. After review, the FCAC felt that clarification and modifications were needed. The modifications were made due to the following:

- Hoses may be of different sizes, not always 1 1/2", so the reference to the size was removed. Also, the language was modified to say that all of the conditions (1, 2 and 3) need to have been met for the removal to be allowed.
- The language in condition 1 was changed to reference installation, not placement, and includes reference to the current IFC and IBC.
- The language in condition 2 was modified to delete an unnecessary fire code official determination; this authority is already established in the charging section.
- A condition 3 was added to ensure that any outlets that remained were useable by the Fire Department by requiring them to be compatible with local fire department fittings.

F150-13

Final Action: AS AM AMPC____ D

F151-13
906.1 (IBC [F] 906.1)

Proposed Change as Submitted

Proponent: Dave Frable representing U.S. General Services Administration, Public Buildings Service

Revise as follows:

906.1 (IBC [F] 906.1) Where required. Portable fire extinguishers shall be installed in the following locations.

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

   ~~**Exception**~~ **Exceptions:**

   1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each *dwelling unit* is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
   2. In new and existing Group B occupancies equipped throughout with quick- response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.

2. Within 30 feet (9144 mm) of commercial cooking equipment.
3. In areas where flammable or *combustible liquids* a restored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

Reason: The intent of this code change is to re-introduce an IFC code requirement that was in the past editions of the IFC (i.e., editions 2000 to 2009). However, in the 2012 edition of the IFC, the subject exception was removed from the IFC without any technical substantiation.

Exception #2 acknowledges the reliable advantages of an automatic sprinkler system designed to comply with NFPA 13. Group B occupancies are considered light hazard occupancies and must be protected by quick response sprinklers (see Section 903.3.2). The faster acting sprinklers and the lower fuel load associated with Group B occupancies alleviate the need for portable fire extinguishers to be installed throughout non-hazardous areas within this occupancy. In addition, the evacuation strategy for this occupancy is for occupants to evacuate building or relocate to a safe area within the building in lieu of delaying evacuation/relocation and having occupants attempt to utilize a portable fire extinguisher to try to extinguish a fire.

It should be noted that building occupants in Group B occupancies are not required to be trained in the use of portable fire extinguishers since training building occupants in the use of portable fire extinguishers is not addressed within the IFC nor is there a requirement in the IFC stating that portable fire extinguishers have been installed for occupant use. In addition, fire department personnel typically will also not use the portable fire extinguishers which have been installed within a building due to the uncertainty they have regarding the subject extinguisher operating when needed. Therefore, the installation of this type of manual extinguishing equipment throughout a Group B occupancy equipped with an operational sprinkler system utilizing quick-response sprinklers is questionable and not warranted or cost effective (e.g., installation costs, maintenance costs, etc.) over the life of a building.

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

906.1-F-FRABLE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that fire extinguishers are still the first line of defense in many situations and should not be removed in Group B occupancies. In fact many fires are never reported due to the fact that extinguishers are used before the fires grow very large. It was also noted that singling out only Group B occupancies was inappropriate. There was some concern raised that fire extinguishers should be a choice and not a requirement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dave Frable, representing U.S. General Services Administration, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

906.1 (IBC [F] 906.1) Where required. Portable fire extinguishers shall be installed in the following locations.

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

   ~~**Exception**~~ **Exceptions:**

   1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each *dwelling unit* is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
   2. In new and existing Group B occupancies having a fire alarm system that activates the occupant notification system in accordance with Section 907.5 and is protected throughout by an automatic sprinkler system designed and installed in accordance Section 903.3.1.1 utilizing quick- response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.
2. Within 30 feet (9144 mm) of commercial cooking equipment.
3. In areas where flammable or *combustible liquids* a restored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

Commenter's Reason: The intent of this code change is to re-introduce an exception for the installation of portable fire extinguishers in Group B occupancies that was in the past editions of the IFC (i.e., editions 2000 to 2009). However, in the 2012 edition of the IFC, the subject exception was removed from the IFC without any technical substantiation.

The new exception will permit a building owner to be exempt from installing portable fire extinguishers in new and existing Group B occupancies if the Group B occupancy has a fire alarm system installed that activates the occupant notification system and that also is protected throughout with an automatic sprinkler system designed and installed in accordance with NFPA 13 that utilizes quick response sprinkler which faster acting sprinklers. Upon activation of the fire alarm system, the typical evacuation strategy for this occupancy is for occupants to evacuate the building or relocate to a safe area within the building in lieu of delaying evacuation/relocation and having occupants attempt to utilize a portable fire extinguisher to try to extinguish a fire. The requirement for the installation of a fire alarm system that will assure that building occupants are notified to evacuate the building in a timely fashion.

It should be noted that building occupants in Group B occupancies are not required to be trained in the use of portable fire extinguishers since training building occupants in the use of portable fire extinguishers is not addressed within the IFC nor is there a requirement in the IFC stating that portable fire extinguishers have been installed for occupant use. In addition, fire department personnel typically will not use the portable fire extinguishers which have been installed within a building due to the uncertainty they have regarding the subject extinguisher operating when needed. Therefore, the installation of this type of manual extinguishing equipment throughout a Group B occupancy equipped with a fire alarm system and an operational sprinkler system utilizing quick-response sprinklers is questionable and not justifiable.

It should also be noted that the Occupational Safety and Health Administration (OSHA), 29 CFR 1910.157(g)(1), also addresses portable fire extinguishers by specifically stating: "Where the employer has provided portable fire extinguishers **for employee use** in the workplace, the employer shall also provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting." Therefore, if portable fire extinguishers have been installed in a building and have been designated for occupant use and incorporated into the building's fire safety plan, training would be required. However, if this protocol for occupants using portable fire extinguishers is not incorporated in the building's fire safety plan, no training would be required. Hence, the occupants will not be properly trained to use the subject portable fire extinguishers as some Code Committee members suggested.

Fire is a rare event; however, should a fire occur in this occupancy, the probability that occupants are knowledgeable and have been trained proficiently in the use of portable fire extinguishers to effectively extinguish a fire is low. We also believe the cost associated with the installation of portable fire extinguishers in these occupancies is unjustified, taking into consideration maintaining the subject fire extinguishers for the life of the building. We also believe these costs savings would be better expended active fire detection and suppression systems.

Opponents of this code change will argue that fire extinguishers are still the first line of defense in many situations and therefore should not be removed in Group B occupancies since occupants should be able to use them if they choose to do so. However, several Fire Code Committee members believe that if this is the case, the installation of portable fire extinguishers in Group B occupancies should also be a choice and not a requirement. We believe that when a fire does occur in an office building, evacuation of the building should be the first action of the occupants, not fighting the fire.

F151-13

Final Action: AS AM AMPC____ D

F154-13
907.2.1 (IBC [F] 907.2.1)

Proposed Change as Submitted

Proponent: Timothy W. Fisher, State of Alaska, Department of Public Safety, Division of Fire and Life Safety, representing Alaska State Fire Marshal's Office & ICC Alaska Central Chapter

Revise as follows:

907.2.1 (IBC [F] 907.2.1) Group A. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies ~~where the occupant load due to the assembly occupancy is 300 or more~~ <u>where a required automatic sprinkler system is installed, the automatic sprinkler system shall be connected to the building fire alarm system.</u> ~~Group A occupancies not separated from one another in accordance with Section 707.3.9 of the International Building Code shall be considered as a single occupancy for the purposes of applying this section.~~ Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

> **Exception:** Manual fire alarm boxes are not required when the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler waterflow.

Reason: In the 2006 International Code Adoption, the requirement for a Fire Sprinkler System in an A-2 occupancy was reduced to an occupant load of 100 from 300. Currently, a Fire Alarm System is required in an A occupancy when the occupant load is greater than 300. This has left a void of 100 to 300 occupants.

Previously, the Fire Alarm System requirements mirrored the Fire Sprinkler System requirements at 300 occupants; it seemed prudent to also require a fire alarm system at 100 occupants in an A-2 occupancy, same as the sprinkler requirement.

The intent of the revision is to remove a set number of (300) for occupant loading from the Fire Alarm System requirements for Assembly (A) Occupancy, then requiring a Fire Alarm System based on the requirements in the Fire Sprinkler System section. Then it would render the Sentence with Section 707.3.9 "Fire Areas" obsolete as it would be based on the Fire Sprinkler System fire area requirements.

The Station Night Club incident didn't have sprinklers, causing a change in the sprinkler requirements where as the Fire Alarm System requirements were not adjusted for A-2 occupancies in the event of an emergency. This change would require notification appliances that would ensure occupants are alerted within an A-2 occupancy during a sprinkler activation or a kitchen hood and duct suppression system activation.

Revising this code section will realign the fire systems according to the historical requirements; provide an acceptable level of fire and public safety as well as providing notification appliances throughout the facility to notify occupants that there is an emergency in the facility and to promptly evacuate, saving lives.

Cost Impact: Cost varies on location, size, and company for the installation of Fire Alarm System (Notification Appliances Only)

907.2.1-F-FISHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The wording was considered confusing as to how it relates the automatic sprinkler requirements to the fire alarm requirements. Also, without further revision the existing exception would be difficult to apply.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Timothy W. Fisher, representing Alaska State Fire Marshal's Office/ ICC Alaska Central Chapter, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[F] 907.2.1 Group A. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies where a required automatic sprinkler system is installed~~, the automatic sprinkler system shall be connected to the building fire alarm system~~. Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

> **Exception:** Manual fire alarm boxes are not required when the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler waterflow.

Commenter's Reason: In the 2006 International Code Adoption, the requirement for a Fire Sprinkler System in an A-2 occupancy was reduced to an occupant load of 100 from 300. Currently, a Fire Alarm System is required in an A occupancy when the occupant load is greater than 300. This has left a void of 100 to 300 occupants.

Previously, the Fire Alarm System requirements mirrored the Fire Sprinkler System requirements at 300 occupants; it seemed prudent to also require a fire alarm system at 100 occupants in an A-2 occupancy, same as the sprinkler requirement.

The intent of the revision is to remove a set number of (300) for occupant loading from the Fire Alarm System requirements for Assembly (A) Occupancy, then requiring a Fire Alarm System based on the requirements of a Sprinkler.

The Station Night Club incident didn't have sprinklers, causing a change in the sprinkler requirements whereas the Fire Alarm System requirements were not adjusted for A-2 occupancies in the event of an emergency. This change would require notification appliances that would ensure occupants are alerted within an A-2 occupancy during a sprinkler activation or a kitchen hood and duct suppression system activation.

Revising this code section will realign the fire systems according to the historical requirements; provide an acceptable level of fire and public safety as well as providing notification appliances throughout the facility to notify occupants that there is an emergency in the facility and to promptly evacuate, saving lives.

Such a facility could have an assembly on the second floor without prompt notification, thus notification appliances should be required. The committees request to clean up the language for sprinkler system has been addressed by a strike through of the connection to the fire alarm, which was taken from the Education code section. The exception can't be removed as per committee request as a "Manual Fire Alarm System" and "Manual fire alarm boxes" are different requirements of the code. The pull box is part of the system.

F154-13

Final Action: AS AM AMPC____ D

F158-13
907.2.3 (IBC [F] 907.2.3)

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

907.2.3 (IBC [F] 907.2.3) Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an occupant load of ~~30~~ 50 or less.
2. Emergency voice/ alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an approved occupant notification signal in accordance with Section 907.5.

~~2~~3. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
   ~~2.1~~ 31. Interior corridors are protected by smoke detectors.
   ~~2.2~~ 3.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by heat detectors or other approved detection devices.
   ~~2.3~~ 33. Shops and laboratories involving dusts or vapors are protected by heat detectors or other approved detection devices.

~~3~~4. Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, the emergency voice/alarm communication system will activate on sprinkler water flow and manual activation.

Reason: Many small schools or day cares consist of one or two rooms. For such small buildings, there is no need to install a notification system to warn occupants of fires or other emergencies, as occupants are typically in close visual or audible contact with all occupied spaces and with each other. This arrangement provides for adequate means to notify all occupants of the building of potential hazardous conditions to initiate emergency actions, including evacuation.

The threshold in Exception 1 has been reduced from 50 to 30 with no apparent loss history. The testimony presented by the proponent of Code Change F107-09/10 was that the number was modified to correlate the occupant load trigger for 1-HR rated corridors. It is common that individual classrooms contain an occupant load of 30 students. It seems that a more appropriate occupant load trigger is the egress provision which requires a second exit at an occupant load of 50, not 30.

An alarm system in a single classroom, or set of small classrooms, does not appear justified. It appears that the appropriate 'occupant load trigger' is 50 since that is when a fire alarm system has been required for many years without any major incidents. Therefore, this proposal will move the trigger to an occupant load of 50 to determine when a manual fire alarm system is required.

Exception 2 is proposed to be added. This exception would require the emergency voice communication system when the occupant load exceeds 100, as buildings with larger numbers of occupants may necessitate detailed instructions regarding evacuation, relocation, or other actions to ensure safety of building occupants. Often, these buildings include multiple floors, fire areas, and egress paths, and occupants may require notification of more detailed or modified instructions on alternate courses action other than those stated in a standard evacuation plan.

The result of this proposal is that when the occupant load is:

50 or less – fire alarm system is not required
51 to 100 – manual fire alarm system is required
101 or more – manual fire alarm system with emergency voice/alarm communication system

Cost Impact: The code change proposal will reduce the cost of construction.

907.2.3-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was felt to be a more reasonable approach for smaller schools. A manual fire alarm system for greater than 50 is reasonable while still maintaining the emergency voice communication system where the occupant load exceeds 100.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Emory Rodgers, VDHCO, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

907.2.3 (IBC [F] 907.2.3) Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an occupant load of 50 or less.
2. Emergency voice/ alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with occupant loads of ~~100~~ 500 or less, provided that activation of the manual fire alarm system initiates an approved occupant notification signal in accordance with Section 907.5.
3. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
   31. Interior corridors are protected by smoke detectors.
   3.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by heat detectors or other approved detection devices.
   3.3 Shops and laboratories involving dusts or vapors are protected by heat detectors or other approved detection devices.
4. Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, the emergency voice/alarm communication system will activate on sprinkler water flow and manual activation.

Commenter's Reason: Setting the threshold at 100 occupants is overly stringent, costly and not justified. This is 4-5 classrooms. There was no data to justify.

In A there is a 1,000 occupant load for these EVAC systems where the patrons are not always familiar with the building or space while in E occupancies there are fire drills, security plans and public address systems that are adequate to convey emergency information that is commonly done in thousands of schools.

The IFC CDC denied F159-13 that had a 1,000 occupant limit as being too large. So 500 is a typical size of an elementary school.

Urge you approval as AM or F159 if it is challenged for approval as submitted.

F158-13

Final Action: AS AM AMPC____ D

F159-13
907.2.3 (IBC [F] 907.2.3)

Proposed Change as Submitted

Proponent: Frank G. Castelvecchi, III, PE, representing County of Henrico, Virginia (cas13@co.henrico.va.us)

Revise as follows:

907.2.3 (IBC [F] 907.2.3) Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of 30 or less.
2. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
   - 2.1. Interior *corridors* are protected by smoke detectors.
   - 2.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.
   - 2.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.
3. Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, the emergency voice/alarm communication system will activate on sprinkler water flow and manual activation is provided from a normally occupied location.
4. <u>An occupant notification system meeting the requirements of Section 907.5.2 without emergency voice/alarm communication system features is permitted where the occupant load is 1000 or less.</u>

Reason: Requiring a voice alarm system for educational uses imposes significant unnecessary costs on daycares and school systems that are already short of funds. Most schools already have public address systems that can be used for emergency notification. The 1000 occupant threshold proposed here is the same as that for assembly buildings with occupants that are less familiar with the building, often do not have public address systems and may involve the consumption of alcoholic beverages. Requiring an expensive voice alarm system in a small storefront daycare center, a small school, or a school trailer is a ludicrous imposition of significant costs on schools and small businesses.

The fire record these occupancies does not justify these added expenses. The children in these occupancies are required to be under competent adult supervision.

Cost Impact: This will reduce the cost of construction

907.2.3 #2-F-CASTELVECCHI

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The revision to 1000 occupants was seen as excessive. Although this comes from the assembly occupancy requirements for schools this number is too high. The benefits of emergency voice communication are too great to set the criteria this high.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Frank G Castelvecchi III PE, representing County of Henrico Virginia, requests Approval as Submitted.

Commenter's Reason: Requiring voice alarm systems in small schools and daycares presents a significant unnecessary cost burden on these small businesses, nonprofits, and local jurisdictions. These occupancies are required to have fire drills and present an excellent safety record. Schools have public address systems with two way communications with the office that can and is used for various emergency communications. The proposed 1000 person threshold is the same as has been established for other assembly occupancies. Virginia in adopting the 2012 IBC/IFC is reverting back to the 2009 language with a 50 person alarm threshold and no requirements for voice alarms in E use groups.

F159-13
Final Action: AS AM AMPC____ D

F162-13, Part I
FC 907.2.11 (IBC [F] 907.2.11), 907.10 (New) (IBC [F] 907.10 (New))

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IFC CODE DEVELOPMENT COMMITTEE AS SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMMITTEE.

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

PART I – INTERNATIONAL FIRE CODE

Revise as follows:

907.2.11 Single- and multiple-station smoke alarms. *Listed* single- and multiple-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.11.1 through 907.2.11.4 and NFPA 72. <u>Single- and multiple-station smoke alarms shall be maintained in accordance with Section 907.10.</u>

<u>**907.10 Single- and multiple-station smoke alarms.** Single- and multiple-station smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in one- and two-family dwellings shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.</u>

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This proposal supplements the requirements in Section 901.4 for testing and maintaining smoke alarms, and specifies when the devices need to be replaced. The proposed requirements are consistent with NFPA 72 provisions. In particular NFPA 72 requires smoke alarms installed in one- and two-family dwellings to not remain in service longer than 10 years from the date of manufacture, and UL 217 requires the date of manufacture to be marked on the smoke alarms.

It is recognized that it may not always be practical for the code official to enforce the requirements for testing, maintenance and replacement of smoke alarms in residential dwelling units. However realtors and landlords often have checklists that verify that these dwellings comply with codes and other requirements, and they may be in a position to verify compliance with the proposed provisions when the units are sold or leased.

UL 217 has required the month and date of manufacture be marked on smoke alarms for more than 10 years.

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

907.2.11-F-ZUBIA-FCAC~REVISED

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information."

PART I – IFC
Committee Action: **Approved as Submitted**

Committee Reason: The provisions requiring the replacement of smoke alarms is needed within the IFC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Emory Rodgers, VDHCO, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

907.2.11 Single- and multiple-station smoke alarms. *Listed* single- and multiple-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.11.1 through 907.2.11.4 and NFPA 72. Single- and multiple-station smoke alarms shall be maintained in accordance with Section 907.10.

907.10 Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. ~~Smoke alarms installed in one- and two-family dwellings shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.~~

Commenter's Reason: Both sections have testing and maintenance requirements and if not operating than the smoke alarms have to be replaced.

There is thus no need to invoke a 10 year mandated replacement.

So how is enforcement to be accomplished? How is the fire or maintenance official to enter into all 1&2 family dwelling units? How can it not increase the cost of maintenance? This maybe a good practice but not to be a mandate. The supporting statement recognizes these enforcement flaws, but then says realtors and landlords can be responsible to verify.

So why not mandate all smoke alarms in any occupancy to be replaced?

Overturn the IFC CDC for AM motion to delete this mandated 10 year replacements.

Public Comment 2:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

907.10 Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in one- and two-family dwellings shall be replaced not more than 10 years from the date of manufacture marked on the unit, or shall be replaced if the date of manufacture cannot be determined.

Commenter's Reason: The modification makes the section clearer and easier to read.

F162-13, Part I
Final Action: AS AM AMPC____ D

F162-13, Part II
IPMC [F] 704.5

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IFC CODE DEVELOPMENT COMMITTEE AS SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMMITTEE.

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

PART II – INTERNATIONAL PROPERTY MAINTENANCE CODE

Add new text as follows:

IPMC [F] 704.5 Maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in Group R or I-1 occupancies shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This proposal supplements the requirements in Section 901.4 for testing and maintaining smoke alarms, and specifies when the devices need to be replaced. The proposed requirements are consistent with NFPA 72 provisions. In particular NFPA 72 requires smoke alarms installed in one- and two-family dwellings to not remain in service longer than 10 years from the date of manufacture, and UL 217 requires the date of manufacture to be marked on the smoke alarms.

It is recognized that it may not always be practical for the code official to enforce the requirements for testing, maintenance and replacement of smoke alarms in residential dwelling units. However realtors and landlords often have checklists that verify that these dwellings comply with codes and other requirements, and they may be in a position to verify compliance with the proposed provisions when the units are sold or leased.

UL 217 has required the month and date of manufacture be marked on smoke alarms for more than 10 years.

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

907.2.11-F-ZUBIA-FCAC~REVISED

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information."

PART II – IPMC
Committee Action: **Approved as Modified**

Modify proposal as follows:

IPMC [F] 704.5 Maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in one and two family dwellings ~~Group R or I-1 occupancies~~ shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.

Committee Reason: This proposal is consistent with the action taken on F162-13 Part I. The modification aligns the language with F162-13 Part I that focuses on one and two family dwellings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Emory Rodgers, VDHCO, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

IPMC [F] 704.5 Maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. ~~Smoke alarms installed in Group R or I-1 occupancies shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.~~

Commenter's Reason: Both sections have testing and maintenance requirements and if not operating then the smoke alarms have to be replaced.

There is thus no need to invoke a 10 year mandated replacement.

So how is enforcement to be accomplished? How is the fire or maintenance official to enter into all 1&2 family dwelling units? How can it not increase the cost of maintenance? This maybe a good practice but not to be a mandate. The supporting statement recognizes these enforcement flaws, but then says realtors and landlords can be responsible to verify.

So why not mandate all smoke alarms in any occupancy to be replaced?

Overturn the IFC CDC for AM motion to delete this mandated 10 year replacements.

Public Comment 2:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

IPMC [F] 704.5 Maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in one and two family dwellings shall be replaced not more than 10 years from the date of manufacture marked on the unit, or <u>shall be replaced</u> if the date of manufacture cannot be determined.

Commenter's Reason: The modification makes the section clearer and easier to read.

F162-13, Part II

Final Action: AS AM AMPC____ D

F164-13
907.2.11.5 (New) (IBC [F] 907.2.11.5 (New))

Proposed Change as Submitted

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association (TomHammerberg@afaa.org)

Revise as follows:

907.2.11.5 (IBC [F] 907.2.11.5) Automatic sprinkler system waterflow. Where an automatic sprinkler system installed in accordance with Section 903.3.1.2 or 903.3.1.3 is provided a sprinkler waterflow alarm-initiating device shall be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Reason: This language is currently used in NFPA-72-2013, 29.7.7.7.3. The purpose is to provide notification to occupants of waterflow activation. If a sprinkler activates in another part of the dwelling unit, this provides earlier warning of the fire situation and will allow additional time to leave the premises. Since the time to escape has reduced significantly in recent years, this will improve fire safety for the occupants.

Cost Impact: minimal

907.2.11.5 (NEW)-F-HAMMERBERG

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Monitoring of NFPA 13D systems was seen as excessive. Homeowners have the option for monitoring but should not be mandated.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas F. Norton, Norel Service Co., Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

907.2.11.5 (IBC [F] 907.2.11.5) Automatic sprinkler system waterflow. Where an automatic sprinkler system installed in accordance with Section 903.3.1.2 or 903.3.1.3 is provided a sprinkler waterflow alarm-initiating device shall be permitted to be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Commenter's Reason: The proposal seeks to permit the Authority Having Jurisdiction (AHJ) to allow the use of a water flow monitoring device the installation of which is described in NFPA-722013 29.7.7.7.3.

F164-13
Final Action: AS AM AMPC____ D

F169-13
907.3.1 (IBC [F] 907.3.1)

Proposed Change as Submitted

Proponent: Barry Greive, representing Target Corporation (barry.greive@target.com)

Revise as follows:

907.3.1 (IBC [F] 907.3.1) Duct smoke detectors. Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit when a fire alarm system is required by Section 907.2. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a constantly attended location and shall perform the intended fire safety function in accordance with this code and the International Mechanical Code. Duct smoke detectors <u>shall report as a supervisory signal not a fire alarm, and they</u> shall not be used as a substitute for required open area detection.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where duct smoke detectors activate the building's alarm notification appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an approved location. Smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

Reason: Duct detectors are widely known to be a cause of false alarms which is a safety concern for first responders. Duct detectors need to report as a supervisory signal to indicate that there is an issue and need to be repaired or replaced but should not report as a fire alarm like a water flow device. This adds clarity to a section that is not enforced uniformly and will add to fire fighter safety by lessening the amount of potential false alarms.

Cost Impact: This will not increase the cost of construction

907.3.1-F-GRIEVE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal would create confusion on the application of the exceptions and possibly create a conflict. It was suggested that the proposal be reworded to deal with the potential conflict in the form of a public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Barry Greive, representing Target Corporation, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

907.3.1 Duct smoke detectors. Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit when a fire alarm system is required by Section 907.2. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a constantly attended location and shall perform the intended fire safety function in accordance with this code and the International Mechanical Code. In facilities that are required to monitored by a supervising station, duct smoke detectors shall only report as a supervisory signal and not a fire alarm ~~and~~. They shall not be used as a substitute for required open area detection.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where duct smoke detectors activate the building's alarm notification appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an approved location. Smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

Commenter's Reason: Duct detectors are widely known to be a cause of false alarms which is a safety concern for first responders. Duct detectors need to report as a supervisory signal to indicate that there is an issue and either need to be repaired or replaced but should not report as a fire alarm like a water flow device. This change adds clarity to a section that is not enforced uniformly and will add to fire fighter safety by lessening the amount of potential false alarms

During the Committee hearings it was mentioned by several members that their reason for denial was that the code section already states that duct detectors shall report as supervisory and no further clarification is needed. Unfortunately this section is widely miss-interpreted, anytime a duct detector reports as a fire alarm we are putting the first responders in harm's way and it takes them away from more important duties. This code section needs greater clarification, smoke detectors and duct smoke detectors are one of the greatest contributors to false alarms in a building.

F169-13

Final Action: AS AM AMPC____ D

F172-13
907.5.2.3.3 (IBC [F] 907.5.2.3.3)

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

907.5.2.3.3 (IBC [F] 907.5.2.3.3) Groups I-1 and R-1. Group I-1 and R-1 *dwelling units* or *sleeping units* in accordance with Table 907.5.2.3.3 shall be provided with ~~a~~ visible alarm notification ~~appliance~~ throughout the unit, activated by both the in-room smoke alarm and the building fire alarm system.

Reason: The revised language will clarify that within hotel rooms and assisted living units that visible alarms must provide full coverage.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

907.5.2.3.3-F-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as the language "throughout the unit" was not specific enough. It was noted that ADA has specific requirements as to how you deal with the space and the proposal should coordinate with those requirements. Concerns specifically related to bathrooms and closets as to how they are to be addressed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

907.5.2.3.3 (IBC [F] 907.5.2.3.3) Groups I-1 and R-1. Group I-1 and R-1 *dwelling units* or *sleeping units* in accordance with Table 907.5.2.3.3 shall be provided with ~~a~~ visible alarm notification appliances, activated by both the in-room smoke alarm and the building fire alarm system. Visible alarm notification appliances shall be provided in all habitable spaces and bathrooms.

Reason: An opponent indicated that ADA and the IBC had different visible alarm requirements. While the 1994 ADA did have separate visible alarm requirements, the 2010 ADA references NFPA 72 for visible alarms.

All alarm systems are required to be installed in accordance with NFPA 72 by Section 907.2. The number of 'hearing impaired' rooms is specifically scoped in Table 907.5.2.3.3. It was not our intent to require visible alarms in closets, but rather in all habitable areas. In a hotel room bathroom, the door may be closed and a person would take out their hearing aid while bathing, so a visible alarm should also be provided in this space.

F172-13

Final Action: AS AM AMPC____ D

F176-13
907.6.5.3 (New) (IBC [F] 907.6.5.3 (New)), 401.3.2

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

<u>**907.6.5.3 Alarm Signal Verification**. Where permitted by the *Fire Chief*, an *approved* supervising station shall be allowed to verify an alarm signal prior to reporting it to the public safety communications center. The verification process shall be in compliance with NFPA 72.</u>

401.3 Emergency responder notification. Notification of emergency responders shall be in accordance with Sections 401.3.1 through 401.3.3.

401.3.1 Fire events. In the event an unwanted fire occurs on a property, the *owner* or occupant shall immediately report such condition to the fire department.

401.3.2 Alarm activations. Upon activation of a fire alarm signal employees or staff shall immediately notify the fire department.

<u>**Exception:** Alarm signal verification permitted by section 907.6.5.3</u>.

401.3.3 Delayed notification. A person shall not, by verbal or written directive, require any delay in the reporting of a fire to the fire department.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

The intent is to allow fire departments to require verification on both commercial and residential alarm signals in order to assist in effective dispatching of resources and/or reducing the impact of nuisance alarms. Currently NFPA 72 allows verification on residential systems (but gives choice of using it to the monitoring company). This would give discretion to the fire chief, and expand use to include commercial alarms which accounts for the majority of false alarms in the U.S.

These provisions allow fire departments to require that alarm monitoring centers attempt to verify an alarm signal before reporting to the 9-1-1 center. Having better information about the cause of alarm activation is critical as many departments have much smaller responses for an automatic alarm signal than for a working structure fire. Additionally, verification has been proven effective in reducing unwanted nuisance alarms. Alarm Verification is already performed extensively on residential fire alarms; this would allow it to be mandated on some or all systems, including commercial occupancies, when required by the Chief.

The revision to Section 401.3 will clarify the intent of the code and alleviate potential interpretation and enforcement conflicts with proposed new section - Section 907.6.5.3 Alarm Signal Verification

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

907.6.5.3 (NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This allowance for alarm signal verification was felt to be a necessary tool for jurisdictions to manage risk in their community. The proposal is consistent with NFPA 72.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Seddig, representing City of Wylie/Wylie Fire Marshal's Office, requests Approval as Modified by this Public Comment

Modify the proposal as follows:

907.6.5.3 Alarm Signal Verification. Where permitted by the *Fire Chief*, an *approved* supervising station shall be allowed 90 seconds to verify an alarm signal prior to reporting it to the public safety communications center. The verification process shall be in compliance with NFPA 72.

401.3 Emergency responder notification. Notification of emergency responders shall be in accordance with Sections 401.3.1 through 401.3.3.

401.3.1 Fire events. In the event an unwanted fire occurs on a property, the *owner* or occupant shall immediately report such condition to the fire department.

401.3.2 Alarm activations. Upon activation of a fire alarm signal employees or staff shall immediately notify the fire department.

Exception: Alarm signal verification permitted by section 907.6.5.3.

Commenter's Reason: The idea of not providing a time frame for reporting fire alarm activation by a monitoring station could be problematic. The NFPA Standard listed below details a maximum time of 90 seconds to verify the alarm signals. To be consistent and give specific guidance, I think it's important to place a time limit for accomplishing the task of verifying alarm signals.

In NFPA 72 (2013) Section 29.7.9.2: Remote monitoring stations shall be permitted to verify alarm signals prior to reporting them to the fire service, provided that the alarm verification process does not delay the reporting more than 90 seconds.

Public Comment 2:

Sean DeCrane, representing Cleveland Division of Fire / International Association of Fire Fighters, requests Disapproval.

Commenter's Reason: The reason for request for Disapproval is a fundamental difference of approach to reduce unwanted alarms. In this proposed change that was approved by the committee the proponent is taking an operational approach to a maintenance issue. We all agree in the benefits of reducing unwanted alarms, in fact this author is very aware of the risks to fire fighters and the public during emergency responses. The issue is how to reduce the unwanted alarms without raising the risks to the building's occupants or the responding fire fighters.

By allowing property owners additional time to verify the legitimacy of an alarm is potentially increasing the risk of loss to that property owner. It also raises the risk to the responding fire fighters. We have seen numerous studies conducted by Underwriters Laboratories and the National Institute of Standards and Technologies demonstrating the increased fuel loads we are placing inside our occupancies. We have realized a shorter time to flashover, an increase in energy produced in today's fires and the widespread use of construction practices utilizing less mass. This is a dangerous combination in the event of an "unwanted" fire.

This issue is a maintenance issue, if an occupancy is experiencing numerous unwanted alarms then the responsible party should be required to determine the cause of the multiple alarms. Is the system aging? Are there construction efforts causing dust? Is it a cleaning or lack of that is causing the situation? All of these situations can be addressed through proper maintenance.

This same committee took the steps and approved the ability of the local fire official to require the replacement of an alarm system if it is not performing as designed or has become a functioning liability. These are the tools to use if a property is experiencing a lack of proper performance of the installed alarm system. To change operational responses by delaying notification is dangerous. Currently many jurisdictions including ours initiates our response, and it can be tiered, and then allows the alarm company to verify the alarm then notify us if they find a situation of an unwanted alarm. We will continue the response by the first due unit to verify the false situation while returning the other responding units to service immediately. In this response if the alarm company determines there is no cause for alarm we return our units. If the alarm company should determine indeed there was a cause for alarm then our crews will arrive earlier in the event with a better chance to bring it to a successful conclusion earlier in the event. I urge you to Disapprove the original submission.

F176-13

Final Action: AS AM AMPC____ D

F178-13
907.8.6 (New)

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

<u>**907.8.6 Problematic systems.** Where required by the fire code official, fire alarm systems that produce chronic, unwanted or nuisance alarms shall be monitored with central station service in accordance with NFPA 72 requirements. A copy of the certificate, placard or other documentation issued by the organization that listed the central station, or the prime fire alarm system contractor, shall be provided to the fire code official.</u>

Reason: This section is intended to address the situation where a fire alarm system has not been repaired to make it fully functional or eliminate chronic unwanted or nuisance alarms. The determination of what constitutes chronic unwanted or nuisance alarms is up to the fire code official to decide based on local policies and practices. By requiring central station service it is understood that the system at the protected premise is now covered by an audit program administered by the company that listed the central station. These audit programs have shown significant success in reducing nuisance and unwanted alarms.

Cost Impact: This proposal will increase the cost of construction.

907.8.6 (NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

907.8.6 Problematic systems. Where required by the fire code official, fire alarm systems that produce chronic unwanted or nuisance alarms shall be monitored with central station service in accordance with NFPA 72 requirements. A copy of the <u>premises</u> certificate, placard or other documentation issued by the organization that listed the central station, or the prime fire alarm system contractor, shall be provided to the fire code official.

Committee Reason: This proposal was preferred to F177-13 and requires central stations to monitor fire alarm systems with chronic unwanted or nuisance alarms. The requirement would involve the need for a maintenance contract. Generally this requirement encourages repair instead of mandating replacement. The cost associated with this requirement was not seen as excessive. The modification simply adds the term “premises” to denote the type of certificate required. There was still some concern as to what was considered “chronic” or “nuisance.”

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

J. William Degnan, President, representing National Association of State Fire Marshals, requests Disapproval.

Commenter’s Reason: NASFM fully supports the intent to provide further incentives for property owners to maintain fire alarm devices and systems in accordance with the applicable reference standard(s). However, the Association does not believe this is the best tactic to achieve such a goal. NASFM continues to believe there remains a lack of clarity in this particular proposal in regard to what the thresholds of a chronic or nuisance alarm are. Additionally, who determines such?

Furthermore, NASFM also has concern that the language as presented in this proposal "…shall be monitored with central station service in accordance with NFPA 72 requirements" could be interpreted to mean that the alarm verification criteria [IE: a delay in FD notification] contained in NFPA 72 would thereafter permissible in all occupancy types.

Public Comment 2:

Dave Frable, representing U.S. General Services Administration, requests Disapproval.

Commenter's Reason: The proponent's intent to reduce the number of "unwanted" fire alarms in buildings in an effort to assist fire departments in effective dispatching of resources is noteworthy. However, this code proposal is not a solution to reduce the number of "unwanted" fire alarms. The proposed text would include non-definable terms in the code (i.e., chronic and nuisance alarms) and mandate that the property owner must have their fire alarm system monitored by a central station service if the code official determines the subject fire alarm system is causing "chronic" alarms. In addition, based on the proposed text and the requirements in NFPA 72, the central station service will need to consist of the following elements: (1) installation of alarm transmitters; (2) alarm, guard, supervisory, and trouble signal monitoring; (3) retransmission; (4) associated record keeping and reporting; (5) testing and maintenance; and (6) runner service. To mandate a building owner to incorporate all of these elements into an existing fire alarm system may be very costly depending on the age and complexity of the fire alarm system.

It should be noted that a vast majority of "unwanted alarms" are due to the existing fire alarm system not being initially designed and installed in accordance with the requirements of NFPA 72 or the fire alarm system not being maintained in accordance with the requirements of NFPA 72. In addition, no data has been provided by the proponent that substantiates that requiring a fire alarm system transmitting alarms directly to a central station service in lieu of directly to (1) a fire department; (2) a public safety communication center; (3) a remote supervising station service or (4) a proprietary supervising station service will reduce the number of "unwanted" alarms. Therefore, without adequate data the added expense for mandating central station service does not seem like a reasonable solution.

In addition, current code text regarding inspection, testing, and maintenance in Section 901.6 in the IFC specifically states that fire alarm systems "shall be maintained in operative condition at all times, and shall be replaced or repaired where defective". This current requirement should adequately address "unwanted" alarms and provide the fire code official authority to require a property owner to repair or replace a fire alarm system which should inherently reduce the number of "unwanted" alarms in a local jursidiction.

F178-13

Final Action: AS AM AMPC____ D

F192-13
909.12.1 (IBC [F] 909.12.1, IMC [F] 513.12.1), 909.20.6 (New)

Proposed Change as Submitted

Proponent: Jeffrey Tubbs, PE, FSFPE, Arup USA, Inc., representing self (jeff.tubbs@arup.com)

Revise as follows:

909.12 (IBC [F] 909.12, IMC [F] 513.12) Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907. Such systems shall be equipped with a control unit complying with UL 864 and *listed* as smoke control equipment.

909.12.1 (IBC [F] 909.12.1, IMC [F] 513.12.1) Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, and the presence of power downstream of all disconnects. A ~~and, through a~~ preprogrammed weekly test sequence shall ~~,~~ report abnormal conditions audibly, visually and by printed report. The preprogrammed weekly test shall operate all devices, equipment, and components.

> **Exception:** Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with normal building operation and produce unwanted effects to normal building operation, such individual components are permitted to be bypassed from the weekly preprogrammed weekly testing, where approved by the code official and in accordance with the following:
>
> 1. Power supplies for components that are bypassed from the preprogrammed weekly test, such as power breakers, power disconnects, automatic transfer switches, motor starters, and motor controls, shall be electrically supervised by the listed control unit.
> 2. Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6.

(Renumber subsequent sections)

909.20.6 Components bypassing weekly test. Where components of the smoke control system are bypassed by the preprogrammed weekly test required by Section 909.12.1 such components shall be tested semi-annually. The system shall also be tested under standby power conditions.

Reason: The current provisions require weekly tests of smoke control systems. For many systems, the weekly test requires the introduction of untreated air into the smoke zone. This can be impractical in areas with cold or hot climates, and for buildings that require close control of temperature and humidity, such as art museums and similar facilities. The introduction of the untreated air can also result in wasting energy to reheat, re-cool, humidify, or dehumidify the smoke control zone.

The intent of the current code provisions is to provide means to verify that the required systems will be available when needed. The code requires and will continue to require control units to comply with UL 864, thus all components of the control system will be supervised. The code change adds requirements for supervision of all power supply components such as power breakers, power disconnects, automatic transfer switches, motor starters, and motor controls. This will provide reasonable assurance that power will be available for all smoke control components, such as fans, dampers, doors, and windows. The code change also adds the semi-annual requirement for a complete system test. This allows the building owner to schedule complete system testing on days that will reduce the impact to the building and energy needs. The combination of additional supervision and additional testing provides a reasonable alternative to weekly testing.

Cost Impact: The code change allows optional additional features that may increase initial costs but reduce long-term operational costs.

909.12.1 (NEW)-F-TUBBS

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides a viable option for the weekly preprogrammed test through semi-annual testing and more restrictive supervision requirements.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey Tubbs, Arup USA Inc, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

909.12 (IBC [F] 909.12; IMC [F] 513.12) Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907. Such systems shall be equipped with a control unit complying with UL 864 and *listed* as smoke control equipment.

909.12.1 (IBC [F] 909.12.1; IMC [F] 513.12.1) Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, and the presence of power downstream of all disconnects. A preprogrammed weekly test sequence shall report abnormal conditions audibly, visually and by printed report. The preprogrammed weekly test shall operate all devices, equipment, and components used for smoke control.

> **Exception:** Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with normal building operation and produce unwanted effects to normal building operation, such individual components are permitted to be bypassed from the ~~weekly~~ preprogrammed weekly testing, where approved by the code official and in accordance with the following:
>
> 1. ~~Power supplies for~~ Where the operation of components ~~that are~~ is bypassed from the preprogrammed weekly test, ~~such as power breakers, power disconnects, automatic transfer switches, motor starters, and motor controls,~~ presence of power downstream of all disconnects shall be ~~electrically supervised~~ verified weekly by ~~the~~ a listed control unit.
> 2. Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6.

(Renumber subsequent sections)

909.20.6 Components bypassing weekly test. Where components of the smoke control system are bypassed by the preprogrammed weekly test required by Section 909.12.1 such components shall be tested semi-annually. The system shall also be tested under standby power conditions.

Commenter's Reason: The intent of the current code provisions is to provide means to verify that the required systems will be available when needed. The code requires and will continue to require control units to comply with UL 864, thus all components of the control system will be supervised. The intent of the code change was to monitor the presence of power downstream rather than to mandate a specific method (electrical supervision vs monitoring of power) for monitoring the presence of power. The revised text retains the requirement to verify that power is present downstream of all disconnects without specifying any particular method, thereby allowing any method that is consistent with the listing of the control unit. As with the original code change, this modification includes the combination of additional supervision and additional testing, and thus provides a reasonable alternative to weekly testing.

F192-13

Final Action: AS AM AMPC____ D

F196-13
910.1 (IBC [F] 910.1), 910.3.5 (IBC [F] 910.3.5), 202, 3202, Table 3206.2

Proposed Change as Submitted

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

910.1 General. Where required by this code or otherwise installed, smoke and heat vents, or mechanical smoke exhaust systems, and draft curtains shall conform to the requirements of this section.

Exceptions:

1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an *approved automatic sprinkler system*.
2. Where areas of buildings are equipped with early suppression fast-response (ESFR) or quick-response storage (QRS) sprinklers, automatic smoke and heat vents shall not be required within these areas.

910.3.5 (IBC [F] 910.3.5) Draft curtains. Where required by Table 910.3, draft curtains shall be installed on the underside of the roof in accordance with this section.

Exception: Where areas of buildings are equipped with ESFR or QRS sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers, and between QRS and the non-QRS sprinklers.

Add new definition as follows:

SECTION 202
GENERAL DEFINITIONS

QUICK RESPONSE STORAGE (QRS) SPRINKLER. A sprinkler with a response time index of 50 or less that is listed to control a specified fire in stored commodities with 12 or fewer sprinklers.

Revise as follows:

SECTION 3202
DEFINITIONS

QUICK RESPONSE STORAGE (QRS) SPRINKLER.

TABLE 3206.2
GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 3206.2 and 3206.4)	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208)[b]					SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic fire-extinguishing system (see Section 3206.4)	Fire detection system (see Section 3206.5)	Building access (see Section 3206.6)	Smoke and heat removal (see Section 3206.7)	Draft curtains (see Section 3206.7)	Maximum pile dimension[c] (feet)	Maximum permissible storage height[d] (feet)	Maximum pile volume (cubic feet)

(Portions of table not shown remain unchanged)

a through i *(No change to current text*

j. Not required when storage areas are protected by early suppression fast response (ESFR) or quick-response storage (QRS) sprinkler systems installed in accordance with NFPA 13.

Reason: Factory Mutual data sheets no longer reference special sprinkler classifications, such as ESFR. Instead, FM now classifies sprinklers as "storage" and "non-storage" and provides appropriate installation parameters. Storage sprinklers now encompass a new category of quick-response sprinklers that share the key characteristics of ESFR sprinklers, i.e. fast response thermal elements and design areas that involve 12 or fewer sprinklers, but are not designated as ESFR. These quick-response storage sprinklers require similar precautions to ESFR sprinklers with respect to not introducing unknowns that were not represented in full-scale fire tests conducted to determine listing parameters. Thereby, it is important to extend the current provisions in Chapters 9 and 32 that are applicable to ESFR sprinklers to include quick-response storage sprinklers.

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

910.1-F-SHAPIRO

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There was concern that the technology was too new to be properly addressed within the code. In addition concerns and questions with regard to smoke and heat vent and the operation of the sprinklers were raised. There was particular concern with the terminology used and related testing. There was some concern for the need to provide specific data and reports for every installation.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing Tyco; Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

910.1 General. Where required by this code or otherwise installed, smoke and heat vents, or mechanical smoke exhaust systems, and draft curtains shall conform to the requirements of this section.

Exceptions:

1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an *approved automatic sprinkler system*.
2. Where areas of buildings are equipped with early suppression fast-response (ESFR) sprinklers, automatic smoke and heat vents shall not be required within these areas.
3. Where areas of buildings are equipped with control mode special application sprinklers with a response time index of 50 or less, which are listed to control a fire in the stored commodities with 12 or fewer sprinklers, automatic smoke and heat vents shall not be required within these areas.

910.3.5 (IBC [F] 910.3.5) Draft curtains. Where required by Table 910.3, draft curtains shall be installed on the underside of the roof in accordance with this section.

Exceptions:

1. Where areas of buildings are equipped with ESFR sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers.
2. Where areas of buildings are equipped with control mode special application sprinklers with a response time index of 50 or less, which are listed to control a fire in the stored commodities with 12 or fewer sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between these areas and areas protected by other types of sprinklers.

TABLE 3206.2
GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

j. Not required when storage areas are protected by either early suppression fast response (ESFR) sprinkler systems or control mode special application sprinklers with a response time index of 50 or less, which are listed to control a fire in the stored commodities with 12 or fewer sprinklers, installed in accordance with NFPA 13.

Commenter's Reason:
Shapiro: The text proposed in this public comment addresses the concerns that were raised at the committee hearing. In particular, it resolves questions that were raised about introducing the new term "quick response storage sprinkler" by no longer using that term, and it clarifies that both the RTI and number of sprinklers operating limits (not just one or the other) must be satisfied to for the referenced sprinklers to be treated equivalently to ESFR.

After the hearing, I spoke with a number of attendees and committee members to better understand their concerns and see if there were other questions about this proposal. I learned that some people were confused as to why the sprinklers included in this proposal are not simply considered ESFR. In response, I explained that the type of sprinklers covered by this proposal is very versatile. They can qualify and be used as either control mode density area (CMDA) or CMSA sprinklers under their UL listing and NFPA 13. When these sprinklers are used as CMDA, they are essentially "regular" sprinklers that can be used with smoke and heat vents because the installation will involve large design areas. When they are used as CMSA with limitations that parallel those that are applicable to ESFR (as described in this proposal), the same concerns about compatibility with smoke and heat vents apply. Once these points were clear, individuals who I spoke with, including some committee members who had opposed the change, agreed with the proposal.

It is also important to note that the proposal was cleared with FM, UL the National Fire Sprinkler Association and the American Fire Sprinkler Association.

Zubia: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

There is a new category of fire sprinklers that shares the key characteristics of ESFR sprinklers, i.e. thermal elements that have a response time index (RTI) of 50 or less and that are listed to protect a design area that involves 12 or fewer sprinklers. These sprinklers are not called ESFR, but they still require similar precautions to ESFR sprinklers with respect to not introducing unknowns, such as smoke and heat vents, that were not present in the full-scale fire tests that determined the listing parameters. Such unknowns can lead to sprinkler "skipping" and exceeding the 12 sprinkler design area, which was the exact concern that led to the ESFR-related provisions that are currently in Chapters 9 and 32. This comment will extend application of the special ESFR provisions to include quick-response storage sprinklers that share ESFR characteristics.

The public comment also resolves the concerns expressed by some at the committee hearing that the introduction of new terminology suggested in the original proposal might have confused some code users. The previously proposed terminology is not included in this public comment. Instead, the technical provisions are provided directly in the sections of the code where they will apply. The text has also been revised to clarify that sprinklers must have BOTH an RTI of 50 or less and be listed to control/suppress a fire with 12 or fewer sprinklers to qualify for an exception to smoke and heat venting requirements. Any sprinkler listed as "quick response" will satisfy the "50 RTI or less" criteria, based on the definition of "quick response" in NFPA 13 Section 3.6.4.7. The number of operating sprinklers will be indicated in the listing criteria for each sprinkler.

In summary, there is no technical basis for not accepting this proposal. The proposed exceptions parallel those that the code already provides for ESFR sprinklers, and the sprinklers that will qualify for the proposed new exceptions must meet the ESFR RTI and suppression area criteria.

F196-13
Final Action: AS AM AMPC____ D

F203-13
913.2.2 (New) [IBC [F] 913.2.2 (New)]

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com)

Revise as follows:

913.2.2 (IBC [F] 913.2.2) Fuel line piping protection. Fuel lines supplying diesel engine driven fire pumps shall be protected by an approved fuel line protective system with a fire-resistance rating equivalent to the fire resistance rating of the construction enclosing the fire pump room where such piping is located in areas outside the fire pump room.

Reason: When electric powered fire pumps are installed Section [F] 913.2 and the referenced standards, (NFPA 20 and NFPA 70), require protection against exposure from fire for the fire pump, the components and the wiring supplying the electric powered fire pump.

NFPA 20
INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION

Chapter 9 Electric Drive for Pumps
9.1.4* All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.

NFPA 70
ARTICLE 695
Fire Pumps

(E) Arrangement. All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards. [20:9.1.4]

Multiple power sources shall be arranged so that a fire at one source does not cause an interruption at the other source.

913.2-F-DAVIDSON

913.2-F-DAVIDSON
Additional NFPA 20 protection language

4.12* Equipment Protection.

4.12.1* General Requirements. The fire pump, driver, controller, water supply, and power supply shall be protected against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism, and other adverse conditions.

4.12.1.1* Indoor Fire Pump Units.

4.12.1.1.1 Fire pump units serving high-rise buildings shall be protected from surrounding occupancies by a minimum of 2-hour fire-rated construction or physically separated from the protected building by a minimum of 50 ft (15.3 m).

4.12.1.1.2 Indoor fire pump rooms in non-high-rise buildings or in separate fire pump buildings shall be physically separated or protected by fire-rated construction in accordance with Table 4.12.1.1.2.

4.12.1.1.3 The location of and access to the fire pump room shall be preplanned with the fire department.

However, the same protection against fire exposure is not provided for fuel lines serving diesel engine powered fire pumps, a component just as important to ensure availability of fire flows as the other fire pump components.

NFPA 20
INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION

11.4.4* Fuel Piping.

11.4.4.1 Flame-resistant reinforced flexible hose listed for this service with threaded connections shall be provided at the engine for connection to fuel system piping.
11.4.4.2 Fuel piping shall not be galvanized steel or copper.
11.4.4.3 The fuel return line shall be installed according to the engine manufacturer's recommendation.

11.4.4.4 There shall be no shutoff valve in the fuel return line to the tank.

11.4.4.5* Fuel Line Protection. A guard, pipe protection, or approved double-walled pipe shall be provided for all exposed fuel lines.

11.4.4.6 Fuel Solenoid Valve. Where an electric solenoid valve is used to control the engine fuel supply, it shall be capable of manual mechanical operation or of being manually bypassed in the event of a control circuit failure.

This proposal adds a new Section "913.2.2 / [F] 913.2.3 Fuel line piping protection" that provides for a level of fire resistance protection equal to the fire-resistance rating of the fire pump room enclosing construction for those portions of the fuel oil piping that are installed outside of the fire pump room where they may be exposed to a fire in the occupancy protected.
The IBC language is shown here for visualization of how the added language would appear in that document.

[F] 913.2 Protection against interruption of service.The fire pump, driver and controller shall be protected in accordance with NFPA 20 against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism and other adverse conditions.

913.2.1 Protection of fire pump rooms. Fire pumps shall be located in rooms that are separated from all other areas of the building by 2-hour fire barriers constructed in accordance with Section 707 or 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

Exceptions:

1. In other than high-rise buildings, separation by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both, shall be permitted in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Separation is not required for fire pumps physically separated in accordance with NFPA 20.

[F] 913.2.2 Fuel line piping protection: In addition to complying the requirements of NFPA 20, Fuel lines supplying diesel powered fire pumps shall be protected against fire by an approved fuel line protective system with a fire-resistance rating equivalent to the rating of the construction enclosing the fire pump room where portions of the fuel line piping are located in areas outside the room the fire pump is located in.

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

913.2-F-DAVIDSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This requirement should be more appropriately addressed by NFPA 20 and not by Chapter 9 of the IFC. There was a question as to what is considered a "fuel line protective system.". Also, no credit is given to buildings provided with an automatic sprinkler system.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert J Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

913.2.2 (IBC [F] 913.2.2) Fuel line piping protection. Fuel lines supplying diesel engine driven fire pumps shall be protected by an approved ~~fuel line protective system~~ method or assembly with a fire-resistance rating equivalent to the fire resistance rating of the construction enclosing the fire pump room where such piping is located in areas of the protected building outside the fire pump room.

Commenter's Reason: In response to the committee concerns the specific methods have been deleted to instead refer to a generic requirement of protection with "an approved method or assembly". In recognition of the committee discussion this modified wording provides for acceptance of a wider base of solutions.

Recognition for sprinkler protection is inherent in the language in that it requires the protection to match the rating required of the pump room enclosure. Section 913.2.1 provides for a reduction in the rating of the pump room enclosure with Exception 1, with the new language tied to the rating of the enclosure the sprinkler recognition is built in.

During the hearing a committee member suggested that clarification be made as to where the piping required the protection. To address that concern, the intent has been clarified that the protection applies to portions of the piping located within the building protected by the fire pump.

In deference to the reason statement mention of the requirement belonging in NFPA 20, the protection from fire and other means of disruption is already in the IBC/IFC Section 913.2. The added language should accompany the language it is building upon.

The introduction of the discussion on NFPA 20 was brought about by testimony from the floor that NFPA 20 requires the fuel supply to be located in the same room as the fire pump. That testimony was incorrect. NFPA 20 only requires the supply to be located within the same room when subject to freezing.

NFPA 20-2010
11.4.3.2 In zones where freezing temperatures [32°F (0°C)] are possible, the fuel supply tanks shall be located in the pump room

Additionally, with many facilities concerned with business continuity, they are providing for generators for backup power with fuel supplies for long periods of time. In doing so it is not uncommon to use the above ground protected fuel supply for both the diesel fuel pump and the generators, the result being a run of supply piping this new section would provide protection for.

F203-13
Final Action: AS AM AMPC____ D

F204-13
913.2.2 (IBC [F] 913.2.2 (New)), Chapter 80 (IBC Chapter 35)

Proposed Change as Submitted

Proponent: Bob Eugene, representing Underwriters Laboratories (Robert.Eugene@ul.com)

Add new text as follows:

913.2.2 (IBC [F] 913.2.2) Circuits supplying fire pumps. Cables used for survivability of circuits supplying fire pumps shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

UL

2196-2001 Tests for Fire Resistive Cables, with revisions through December 7, 2003……..913.2.2

Reason: UL 2196 is the ANSI approved standard for tests of fire resistive cables. NFPA 20 (fire pumps) includes selective survivability requirements to assure integrity of certain critical circuits. NFPA 70 does not specify the applicable standard within the mandatory provisions of the code, but recognizes electrical circuit protective systems as an alternate to listed cables. An electrical circuit protective system is a field assembly of components that must be installed according to the listing requirements and manufacturer's instructions in order to maintain the listing for the system. There are more than two dozen electrical circuit protective systems listed in the UL Fire Resistance Directory.

Cost Impact: None.

Analysis: A review of the standard proposed for inclusion in the code, UL 2196-2001, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

913.2.2 (NEW)-F-EUGENE

Committee Action Hearing Results

For staff analysis of the content of UL2196-2001 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Approved as Submitted**

Committee Reason: This provides a direct reference to the standard that addresses cables used to provide survivability of circuits. This reference was felt necessary to avoid confusion as to what was required in accordance with NFPA 20 and NFPA 70.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob Eugene, representing UL LLC, requests Approval as Modified by Public Comment.

Modify the proposal as follows:

UL	Underwriters Laboratories	
Standard Reference Number	**Title**	**Referenced in Code Section Number**
2196-2001	Tests for Fire Resistive Cables, with revisions through ~~December 7, 2003~~ March 2012	913.2.2 (913.2.2)

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This proposal was originally submitted with the Group A proposals, but held over for the Group B proposals. The revisions to the standard, including ANSI approval, occurred after the original submittal and should be included in the 2015 edition of the codes.

Analysis: The edition of UL2196 that was submitted for review by the IFC Committee included the revisions through March, 2012. For the analysis of the content of this standard, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

F204-13

Final Action: AS AM AMPC____ D

F205-13
913.3 (New) [IBC [F] 913.3(New)]

Proposed Change as Submitted

Proponent: Jeffrey M. Hugo, CBO, representing the National Fire Sprinkler Association (hugo@nfsa.org)

Add new text as follows:

913.3 (IBC [F] 913.3) Fire Pump rooms egress and access. Fire pump rooms located on levels other than the level of exit discharge shall discharge into an exit passageway constructed in accordance with Section 1023 or directly into a interior exit stairway in accordance with Section 1022.

Reason: New sections are necessary as NFPA 20 permits fire pump rooms to be located on floors that are not always on the same floor as the level of exit discharge. While the fire pump is operating, NFPA 20 requires building personnel to be in the room for testing and during a fire event and requires the exit of the fire pump room to go into an exit passageway.

During a fire, the person being sent to the pump room on an upper or lower floor than the level of exit discharge needs to be able to safely get from the stairwell to the pump room without encountering the fire. Therefore, the exit stairwell or an exit passageway needs to lead to the pump room.

Cost Impact: Will not increase the cost of construction

913.2.1.2 (NEW)-FS-HUGO

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The primary concern with this proposal is that it would create a conflict with the IBC exit passageway requirements in Chapter 10. It was suggested that perhaps rated corridors may be a better approach to provide a protected path to fire pump rooms.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dave Frable, representing U.S. General Services Administration, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

913.~~3~~ 2(IBC [F] 913.~~3~~ 2) ~~Fire Pump rooms egress and access.~~ ~~Fire pump rooms located on levels other than the level of exit discharge shall discharge into an exit passageway constructed in accordance with Section 1023 or directly into a interior exit stairway in accordance with Section 1022~~. **Location and access.** The location and accessibility of the fire pump room shall be approved by the fire chief.

Commenter's Reason: The intent of this proposed code change is to provide some direction to architects when determining the location of a fire pump room in a project. The new code text should also provide design flexibility on a case-by-case basis in determining best location for the fire pump room. We believe the proposed language will also meet the original intent of the proponent and concerns raised by the Code Committee. The proposed language is similar language in Section 508, Fire Command Center.

F205-13
Final Action: AS AM AMPC____ D

F210-13
1101.3

Proposed Change as Submitted

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1101.3 Permits. Permits for alterations necessary to comply with this section shall be required as set forth in Section~~s 105.6 and 105.7 and the *International Building Code*~~ 105.1 of the *International Existing Building Code*.

Reason: This change will direct the code user to the correct reference section for obtaining a permit to make any alterations necessary to conform to this section of the IFC. Sections 105.6 and 105.7 are for operational permits for various operations or the installation of certain systems, not alterations to an existing building. With the deletion of Chapter 34 from the IBC, the only provisions in the ICC family of codes for permits for existing buildings are found in the IEBC.

Cost Impact: There is no cost impact of this change.

1101.3 (NEW)-F-COLLINS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that, while the intent of the code change is good, the amount of testimony in opposition indicated that the proposal is more than just a simple correlation issue and needs additional work to revise other sections affected by the change. It was also felt that the reference to the IBC needs to be retained in the section.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert J Davidson, representing Davidson Code Concepts, LLC and David S. Collins, FAIA, The Preview Group, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1101.3 Permits. Permits for alterations necessary to comply with this section shall be required as set forth in Section 105.7, the *International Building Code* and Section 105.1 of the *International Existing Building Code*.

Commenter's Reason: In response to the committee comments and testimony, in this modification ONLY the reference to operational permits of the IFC has been deleted since installation/construction of the improvements in Chapter 11 are not operational permit activities, they are construction permit topics. The reference to the IBC has been left in as requested by the committee and the reference to the IEBC has been added since that is the document to refer to now that Chapter 34 has been removed from the IBC.

F210-13
Final Action: AS AM AMPC____ D

F212-13, Part I
1103.1, 1104.1

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IFC CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE IEBC CODE DEVELOPMENT COMMITTEE AS SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov)

PART I – INTERNATIONAL FIRE CODE
.
Revise as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.
2. Group U occupancies.

SECTION 1104
MEANS OF EGRESS FOR EXISTING BUILDINGS

1104.1 General. *Means of egress* in existing buildings shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.24.

Exception: Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.

Reason: The changes provide tradeoffs for installation of automatic sprinkler systems consistent with those allowed for new construction and also with those allowed by CMS. In many editions of the legacy codes and the ICC Codes dating from the 1980s and even before, the same or similar tradeoffs were allowed when a facility elected to provide sprinkler protection. The AD Hoc Committee on Health Care is proposing requiring retrofit of sprinklers in Hospitals that we feel provide the best protection available and feel because of this the tradeoffs are justified in existing facilities as has been vetted and justified in new construction for many years. These requirements are part of a package of retrofit requirements that provide a minimum level of safety considered necessary for patients, staff and first responders in an environment in which patients are in many instances not capable of self preservation and must be protected in place. Automatic sprinkler protection is key to any plan for protecting residents in place and for the safety of those responding to emergencies by providing the extra time needed to respond. The requirements are also consistent with current CMS standards that apply to all hospitals nationwide receiving Medicare/Medicaid funding and would not add additional requirements to those facilities beyond current nationwide Federal requirements but would allow the facilities to better meet those requirements without possible costly conflicts in other codes.

If this proposal is successful and the proposal for a new Section 1105 is also approved, the Adhoc Health Care committee will bring forward a corresponding exception to be applicable for the new Section 1105.1 as follows:

SECTION 1105
CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.1 General. Existing Group I-2 shall meet the following requirements:

1. The minimum fire safety requirements in Section 1103, and
2. The minimum egress requirements in Section 1104, and
3. The additional egress and construction requirements in Sections 1105.2 through 1105.7.5.2.

Where the provisions of this chapter conflict with the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

> **Exception:** Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where a sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protective, penetrations and joints are not required in new construction for sprinklered buildings.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

Cost Impact: None

1103.1-F-WILLIAMS-ADHOC

Committee Action Hearing Results

PART I – IFC
Committee Action: Disapproved

Committee Reason: The disapproval was based on the committee's concerns that the proposal needs to be well-correlated with code change EB26-13 which is related. It was also unclear as to why the exception should be limited to Group I-2 Condition 2 only when other occupancies would likely want to take advantage of it. The proposal also does not take into account alternative methods that may have been previously granted. Record keeping and documentation of reduced fire resistance ratings would be a major challenge as would trying to determine rating reductions by visual inspection.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, request Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

~~The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.~~

Exception: Group U occupancies.

<u>**1103.1.1 Existing construction.** The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.</u>

<u>**Exception:** Where approved by the fire code official, in Group I-2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the fire code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.</u>

Reason: This code change responds to the committee's questions regarding the original proposal while keeping true to its original purpose. The Adhoc Healthcare Committee (AHC) firmly believes that all hospital buildings should be retroactively sprinklered throughout. This code change provides incentives for facilities to do that. It also addresses a common question. As code officials, we are often faced with existing building stock that has been upgraded by adding a sprinkler system. This code change and EB 26 were intended to provide the code official with a means, written in code, to accommodate the relatively common practice of reconsidering the value of SOME existing passive systems when sprinklered are installed.

To be clear, this code change is only the incentive. During the Group A hearing the Fire Code committee passed a proposal from AHC to REQUIRE mandatory retroactive sprinklering throughout the building. This change provides the incentive for hospital administrator's move to this requirement sooner. As mentioned in the committee's reason statement, EB 26 was a more comprehensive, better crafted code change. The AHC listened and based this public comment entirely on the language from EB-26. The committee questioned why this code change solely focused on Group I-2 when EB-26 broadly applied to all occupancies. While the AHC might agree with that point, our scope is limited to Group I-2 facilities and any change that addressed other occupancies would be out of scope. The fire code committee asked whether this change would take into account the previous alternative methods. This change would not invalidate the ability of a code official to consider ANY alternative means or method available to them. We are not touching any section that would allow a code that deals with alternative methods. In fact, this change supports the concept that the decision belongs in the hands of the code official. The committee's last statement furthers that idea. The committee was concerned that record keeping for decisions and any reduced fire ratings would be problematic. The revised language taken straight from EB 26 the burden for identifying existing conditions, documenting changes and providing evaluation reports squarely on the shoulders of the applicant. Foe comparison, the approved language of EB-26 is shown below:

EB26-13 AM

<u>**803.6 Fire-resistance ratings.** Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 and 903.3.1.2 of the International Building has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the International Building Code.</u>

<u>Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.</u>

The AHCs proposal is different from EB 26 in two specific ways. The scope of the AHCs work (along with co-proponent ICC Code Technology Committee) is Group I-2. In EB 26, the existing building code committee approved the same concept for all occupancy types. Since the scope of this change is limited to I-2, the reference to a residential sprinkler system per 903.3.1.2 is not appropriate and was deleted. The AHC is also recommending to delete the reference to Chapter 9. While this reference would provide an additional pointer to the sprinkler requirements, it would also pick requirements for things like smoke control or pressurized stairs. We believe these have little relation to fire resistance ratings. In addition, the AHC has already sponsored a comprehensive set of code changes for minimum existing fire protection rating in the committee approved changes for Section 1105. In these changes, the committee approved sweeping retroactive minimum standards that address concepts like corridor construction, structural fire protection ratings, retroactive smoke compartmentation and many other changes. These changes go way beyond what is required by the current "maintain it under the code from which it was constructed" logic of chapter 7. They can be found in F236 through F243. We believe these fundamental increases to chapter 11, along with the committee's preferred language from EB 26 is comprehensive package.

Public Comment 2:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council (IFC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. Where approved by the building code official in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code provided the building also complies with the other applicable fire protection requirements of Chapter 9 and Chapter 10 of the *International Building Code*.

   Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

   ~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~
2. Group U occupancies.

SECTION 1104
MEANS OF EGRESS FOR EXISTING BUILDINGS

1104.1 General. *Means of egress* in existing buildings shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.24.

Exception: Where approved by the building code official in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code provided the building also complies with the other applicable fire protection requirements of Chapter 9 and Chapter 10 of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance

<u>ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.</u>

~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~

Commenter's Reason: This modification makes the language in this proposal consistent with the language approved in EB26-13, but also adds a critical element that is lacking in the current proposal.

The current proposal as modified by the Committee would permit all of the sprinkler tradeoffs permitted for new construction in the IBC, even though the means of egress of the existing building have not been evaluated. If a building falls short of the IBC's requirements for means of egress (IBC Chapter 10), allowing that building to then take all of the IBC's sprinkler trade-offs and cease maintenance of fire safety features that would be traded away for sprinklers will result in reducing the level of fire safety of that existing building well below its current levels, and well below the level envisioned by the IBC. The minimum requirements of the IBC for means of egress are clearly stipulated in Chapter 10. These minimums are assumed to be in place and thus required before the sprinkler tradeoff provisions are permitted in other sections of the Code. The IBC goes as far as to state the following:

> **"1001.2 Minimum requirements.** It shall be unlawful to alter a building or structure in a manner that will reduce the number of *exits* or the capacity of the *means of egress* to less than required by this code."

By attempting to take advantage of <u>all</u> of the permitted reductions in fire-resistance ratings permitted by the IBC under these assumptions, this proposal needs to ensure that the base level of fire safety is also maintained. A fully adequate (safe) means of egress is an absolute bare minimum requirement. With a building already having egress deficiencies as compared to the current IBC, there should not be a possibility to further reduce fire safety features in that building.

As just one example, if an existing building had egress stairs that were narrower than the current IBC would allow, then allowing existing fire-rated egress corridors to lose their fire resistance rating could be a very detrimental loss of an essential fire safety feature for the evacuating occupants, who could be forced to wait much longer in the corridors before being able to enter the stairway.

This proposal attempts to outline the process for a proper review to be performed by the building code official to ensure there are no impediments to granting an approval that may result in the reduction of existing levels of protection. The suggested language provides that once an existing building is sprinklered throughout and meets the other fire protection requirements of Chapter 9 and Chapter 10 of the IBC, plans, investigation and evaluation reports, and other data can be submitted seeking approval of the code official for the assignment of the new fire-resistance ratings which might me a reduction, or potentially an increase. The suggested language also requires that any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. This is to ensure special conditions are identified that may prevent a reduction in fire-resistance ratings.

An additional part of this Code Change Comment clarifies that the responsibility for reviewing these evaluations, which are based solely on the new construction requirements of the IBC, rests with the Building Official rather than the Fire Code Official. It is the building officials that have the training and experience to review a building for compliance to the IBC. It cannot be assumed that all Fire Official have the required knowledge of the IBC to critically evaluate a building against IBC requirements.

Public Comment 3:

Robert J Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. <u>Where a change in fire resistance rating has been approved in accordance with Section 803.6 of the International Existing Building Code.</u> ~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~

2. Group U occupancies.

Commenter's Reason: In response to the committee reason statement this proposal coordinates the IFC with the new language added to the IEBC by EB26-13 with a direct reference to the new language.

This puts into place a process for what is currently happening. Jurisdictions are granting approvals for passive fire protection reduction without clear guidance from the family of I-Codes. In some cases the reductions can be haphazardly approved and when buildings are not provided with an automatic fire suppression system throughout. The requirement is for the entire building to be sprinklered before this evaluation is considered and the pointer to the new Section 803.6 affirms that requirement and provides for a thorough review of the passive protection the applicant is seeking to obtain approval for reduction. This will have the added benefit of stopping the reduction in passive protections for projects to individual work areas or smoke compartments. The building would have to be considered as a whole.

EB26 is included here for reference.

EB26-13 AM

803.6 Fire-resistance ratings. *Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 and 903.3.1.2 of the International Building has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the International Building Code.*

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Public Comment 4:

William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. ~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~
   Where approved by the code official, in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.
   Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features including fire resistance rated assemblies and smoke resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

2. Group U occupancies.

SECTION 1104
MEANS OF EGRESS FOR EXISTING BUILDINGS

1104.1 General. *Means of egress* in existing buildings shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.24.

Exception: ~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~

Where approved by the code official, in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.
Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features including fire resistance rated assemblies and smoke resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Commenter's Reason: As suggested by the Code Development Committee, the proposal uses language similar to EB26 as the basis for the exception originally proposed for Sections 1103.1 and 1104.1. The differences between the language proposed and EB26 are as follows:

- The application is limited to Group I-2, Condition 2 as originally proposed in F212.
- The use of NFPA 13R sprinkler systems (903.3.1.2). NFPA 13R systems are not appropriate for Group I-2, Condition 2 occupancies.
- The reference to Chapter 9 was deleted since it implies that Chapter 9 requirements are the only ones that need to be considered. A similar Public Comment has been submitted on EB26.

The list of items to be considered has been expanded to include rated assemblies, means of egress assemblies, and fire code deficiencies. It is understood that this is in the IFC but it also recognizes that existing buildings may have deficiencies that still need to be addressed through a plan of correction. A similar Public Comment has been submitted on EB26.

Public Comment 5:

William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1 ~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~
Where approved by the code official, in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.
Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current

<ins>building code fire-resistance ratings. Any special construction features including fire resistance rated assemblies and smoke resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. Where required by the code official, the plans and evaluation reports submitted to the code official shall be prepared by a registered design professional.</ins>

2. Group U occupancies.

SECTION 1104
MEANS OF EGRESS FOR EXISTING BUILDINGS

1104.1 General. *Means of egress* in existing buildings shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.24.

> **Exception:** ~~Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.~~ <ins>Where approved by the code official, in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable requirements of the *International Building Code*.</ins>
>
> <ins>Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features including fire resistance rated assemblies and smoke resistive assemblies, conditions of occupancy, means of egress conditions, fire code deficiencies, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. Where required by the code official, the plans and evaluation reports submitted to the code official shall be prepared by a registered design professional.</ins>

Commenter's Reason: As suggested by the Code Development Committee, the proposal uses language similar to EB26 as the basis for the exception originally proposed for Sections 1103.1 and 1104.1. The differences between the language proposed and EB26 are as follows:

- The application is limited to Group I-2, Condition 2 as originally proposed in F212.
- The use of NFPA 13R sprinkler systems (903.3.1.2). NFPA 13R systems are not appropriate for Group I-2, Condition 2 occupancies.
- The reference to Chapter 9 was deleted since it implies that Chapter 9 requirements are the only ones that need to be considered. A similar Public Comment has been submitted on EB26.
- The list of items to be considered has been expanded to include rated assemblies, means of egress assemblies, and fire code deficiencies. It is understood that this is in the IFC but it also recognizes that existing buildings may have deficiencies that still need to be addressed through a plan of correction. A similar Public Comment has been submitted on EB26.

This verbiage differs from our similar Public Comment in that it provides an additional provision that the Code Official may require the plans and evaluation reports to be prepared by a registered design professional. There may be some instances in would be appropriate to have a registered design professional prepare the evaluation to determine which requirements from the IBC should be applicable.

Public Comment 6:

Steve Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 1103
FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. Where approved in accordance with Section 102.4, ~~in Group I-2 Condition 2~~ buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.
2. Group U occupancies.

SECTION 1104
MEANS OF EGRESS FOR EXISTING BUILDINGS

1104.1 General. *Means of egress* in existing buildings shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.24.

Exception: Where approved in accordance with Section 102.4, ~~in Group I-2 Condition 2~~ buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.1.1.2 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.

Commenter's Reason: This proposal should not just apply to Group I-2 occupancies. When the ad hoc committee worked on this issue, they were limited in scope to just I-2 occupancies. Therefore, they could not propose a change that would be applicable to other occupancies. Therefore, this public comment expands the scope of the provision to all occupancies.

If an owner of an existing building chooses to install an automatic fire sprinkler system, they should be able to take advantage of all of the modifications permitted by the current codes. They should not be penalized if a complete fire sprinkler system is installed.

Public Comment 7:

Vickie Lovell, Intercode, Inc., representing Fire Safe North America, formerly known as Alliance For Fire and Smoke Containment and Control, requests Disapproval.

Commenter's Reason: The committee succinctly identified numerous concerns related to the implementation of this poorly written proposal. The decision making process of determining which assemblies and features would be eliminated or reduced is distilled into one sentence. This proposal, if approved, would give unlimited decision making power to an unidentified person(s) to arbitrarily determine what becomes obsolete and what stays functioning without any defined qualifications.

Granted, a hospital may have access to advanced health care facilities engineering to determine what fire protection features are relevant in a sprinklered building. However, the committee rightfully posed the questions as to why the exception should be limited to Group I-2 Condition 2 only when other occupancies would likely want to take advantage of such a broad, sweeping exception to Section 1103 if it were to be approved. If every occupancy and use group were afforded the opportunity to reduce the ratings throughout without any accountability or qualifications, the International Fire Code would likely become irrelevant.

The recommendation for disapproval is merited, and the committee correctly identified EB26 as having improved language, but still needing further modifications.

F212-13, Part I
Final Action: AS AM AMPC____ D

F212-13, Part II

IEBC 804.2.2.2 (NEW)

<u>Proposed Change as Submitted</u>

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IFC CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE IEBC CODE DEVELOPMENT COMMITTEE AS SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov)

PART II – INTERNATIONAL EXISTING BUILDING CODE

Add new text as follows:

<u>**804.2.2.2 Group I-2.** Where approved, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building Code* has been added and the building is now equipped throughout with an automatic sprinkler system, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for buildings equipped throughout with an automatic sprinkler system.</u>

Reason: The changes provide tradeoffs for installation of automatic sprinkler systems consistent with those allowed for new construction and also with those allowed by CMS. In many editions of the legacy codes and the ICC Codes dating from the 1980s and even before, the same or similar tradeoffs were allowed when a facility elected to provide sprinkler protection. The AD Hoc Committee on Health Care is proposing requiring retrofit of sprinklers in Hospitals that we feel provide the best protection available and feel because of this the tradeoffs are justified in existing facilities as has been vetted and justified in new construction for many years. These requirements are part of a package of retrofit requirements that provide a minimum level of safety considered necessary for patients, staff and first responders in an environment in which patients are in many instances not capable of self preservation and must be protected in place. Automatic sprinkler protection is key to any plan for protecting residents in place and for the safety of those responding to emergencies by providing the extra time needed to respond. The requirements are also consistent with current CMS standards that apply to all hospitals nationwide receiving Medicare/Medicaid funding and would not add additional requirements to those facilities beyond current nationwide Federal requirements but would allow the facilities to better meet those requirements without possible costly conflicts in other codes.

If this proposal is successful and the proposal for a new Section 1105 is also approved, the Adhoc Health Care committee will bring forward a corresponding exception to be applicable for the new Section 1105.1 as follows:

SECTION 1105
CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

<u>**1105.1 General**</u>**.** Existing Group I-2 shall meet the following requirements:

1. The minimum fire safety requirements in Section 1103, and
2. The minimum egress requirements in Section 1104, and
3. The additional egress and construction requirements in Sections 1105.2 through 1105.7.5.2.

Where the provisions of this chapter conflict with the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

> <u>**Exception:** Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where a sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protective, penetrations and joints are not required in new construction for sprinklered buildings.</u>

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the <u>American Society for Healthcare Engineering</u>, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

Cost Impact: None

1103.1-F-WILLIAMS-ADHOC

Committee Action Hearing Results

PART II – IEBC
This code change was heard by the IEBC code development committee.

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal in favor of the action taken on EB26-13 and by the request of the proponent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council (IFC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

804.2.2.2 Group I-2. Where approved by the building code official in Group I-2, Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code provided the building also complies with the other applicable fire protection requirements of Chapter 9 and Chapter 10 of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

~~Where approved, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building Code* has been added and the building is now equipped throughout with an automatic sprinkler system, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for buildings equipped throughout with an automatic sprinkler system.~~

Commenter's Reason: This modification makes the language in this proposal consistent with the language approved in EB26-13, but also adds a critical element that is lacking in the current proposal.

The current proposal as modified by the Committee would permit all of the sprinkler tradeoffs permitted for new construction in the IBC, even though the means of egress of the existing building have not been evaluated. If a building falls short of the IBC's requirements for means of egress (IBC Chapter 10), allowing that building to then take all of the IBC's sprinkler trade-offs and cease maintenance of fire safety features that would be traded away for sprinklers will result in reducing the level of fire safety of that existing building well below its current levels, and well below the level envisioned by the IBC. The minimum requirements of the IBC for means of egress are clearly stipulated in Chapter 10. These minimums are assumed to be in place and thus required before the sprinkler tradeoff provisions are permitted in other sections of the Code. The IBC goes as far as to state the following:

> "**1001.2 Minimum requirements.** It shall be unlawful to alter a building or structure in a manner that will reduce the number of *exits* or the capacity of the *means of egress* to less than required by this code."

By attempting to take advantage of all of the permitted reductions in fire-resistance ratings permitted by the IBC under these assumptions, this proposal needs to ensure that the base level of fire safety is also maintained. A fully adequate (safe) means of egress is an absolute bare minimum requirement. With a building already having egress deficiencies as compared to the current IBC, there should not be a possibility to further reduce fire safety features in that building.

As just one example, if an existing building had egress stairs that were narrower than the current IBC would allow, then allowing existing fire-rated egress corridors to lose their fire resistance rating could be a very detrimental loss of an essential fire safety feature for the evacuating occupants, who could be forced to wait much longer in the corridors before being able to enter the stairway.

This proposal attempts to outline the process for a proper review to be performed by the building code official to ensure there are no impediments to granting an approval that may result in the reduction of existing levels of protection. The suggested language provides that once an existing building is sprinklered throughout and meets the other fire protection requirements of Chapter 9 and Chapter 10 of the IBC, plans, investigation and evaluation reports, and other data can be submitted seeking approval of the code official for the assignment of the new fire-resistance ratings which might me a reduction, or potentially an increase. The suggested language also requires that any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. This is to ensure special conditions are identified that may prevent a reduction in fire-resistance ratings.

An additional part of this Code Change Comment clarifies that the responsibility for reviewing these evaluations, which are based solely on the new construction requirements of the IBC, rests with the Building Official rather than the Fire Code Official. It is the building officials that have the training and experience to review a building for compliance to the IBC. It cannot be assumed that all Fire Official have the required knowledge of the IBC to critically evaluate a building against IBC requirements.

Public Comment 2:

Steve Thomas, Colorado Code Consulting, LLC, representing Colorado Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

804.2.2.2 ~~Group I-2~~ Sprinklered Buildings. Where approved, ~~in Group I-2 Condition 2~~ buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.1.1.2 of the *International Building Code* has been added and the building is now equipped throughout with an automatic sprinkler system, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for buildings equipped throughout with an automatic sprinkler system.

Commenter's Reason: This proposal should not just apply to Group I-2 occupancies. When the ad hoc committee worked on this issue, they were limited in scope to just I-2 occupancies. Therefore, they could not propose a change that would be applicable to other occupancies. Therefore, this public comment expands the scope of the provision to all occupancies.

If an owner of an existing building chooses to install an automatic fire sprinkler system, they should be able to take advantage of all of the modifications permitted by the current codes. They should not be penalized if a complete fire sprinkler system is installed.

Public Comment 3:

Vickie Lovell, Intercode, Inc., representing Fire Safe North America, formerly known as Alliance For Fire and Smoke Containment and Control, requests Disapproval.

Commenter's Reason: The committee succinctly identified numerous concerns related to the implementation of this poorly written proposal. The decision making process of determining which assemblies and features would be eliminated or reduced is distilled into one sentence. This proposal, if approved, would give unlimited decision making power to an unidentified person(s) to arbitrarily determine what becomes obsolete and what stays functioning without any defined qualifications.

Granted, a hospital may have access to advanced health care facilities engineering to determine what fire protection features are relevant in a sprinklered building. However, the committee rightfully posed the questions as to why the exception should be limited to Group I-2 Condition 2 only when other occupancies would likely want to take advantage of such a broad, sweeping exception to Section 1103 if it were to be approved. If every occupancy and use group were afforded the opportunity to reduce the ratings throughout without any accountability or qualifications, the International Fire Code would likely become irrelevant.

The recommendation for disapproval is merited, and the committee correctly identified EB26 as having improved language, but still needing further modifications.

F212-13, Part II

Final Action: AS AM AMPC____ D

F218-13
1103.4.1

Proposed Change as Submitted

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov)

Revise as follows:

IFC 1103.4.1 Group I occupancies. In Group I occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

Exceptions:

1. In Group I-2 Condition 2 equipped throughout with an automatic sprinkler system, vertical opening connecting two or more stories need not be protected with 1-hour fire-resistance-rated construction where both of the following conditions are met:
   1.1. The atrium volume is accounted for in the design of a smoke control system in accordance with Section 909.
   1.2 The floor levels within the vertical opening shall contain only low or ordinary fire hazard uses.
2. In Group I-2 Condition 2, where an automatic sprlnkler system is installed in accordance with Section 404.6 of the *International Building Code,* glass walls shall be considered to be equivalent to 1-hour fire-resistance-rated construction for purposes of this section. Where glass doors are provided in the glass wall, they shall be either self-closing or automatic-closing.
3. In Group I-2 Condition 2, 1-hour fire-resistance-rated construction is not required where a glass-block wall assembly complying with Section 2110 of the *International Building Code* and having a ¾-hour fire protection rating is provided.

Reason: The intent of this code change is to make the IFC consistent with federal standards that are in place for the maintenance of Group I-2 Condition 2 (hospitals) and to clarify the allowable use and construction of atria in hospitals. This adds language to clarify the fire hazard class allowed in the existing atrium (no higher than ordinary), as opposed to only low hazard class in new. A smoke control system is also acknowledged as a factor when it comes to separation of the atrium, and clarifies that the smoke control system's engineering analysis must account for any spaces open to it.

Glass walls points back to the language in IBC Section 404.6 in an attempt to set that as a minimum, retroactive standard. It is far simpler to address a potential deficiency with addition of a smoke control system or properly installed sprinklers at the glass, rather than reconstructing the walls themselves.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 5 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx

Cost impact: This proposal would make the IFC consistent with federal standards that are in place for the maintenance of hospitals, and therefore would not represent an increase in cost.

907.2.6-F-WILLIAMS-ADHOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's concern that the exceptions in the proposal do not exactly mirror Section 404.6 of the IBC which it felt should be the minimum standard. The automatic sprinkler requirements are also not coordinated with regard to complete protection of the building or only protection in the Group I-2 fire area.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

IFC 1103.4.1 Group I occupancies. In Group I occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

Exceptions:

1. In Group I-2, unenclosed vertical openings not exceeding two connected stories and not concealed within the building construction shall be permitted as follows:
   - 1.1 The unenclosed vertical openings shall be separated from other unenclosed vertical openings serving other floors by a smoke barrier.
   - 1.2 The unenclosed vertical openings shall be separated from corridors by smoke partitions.
   - 1.3 The unenclosed vertical openings shall be separated from other fire or smoke compartments on the same floors by a smoke barrier.
   - 1.4 On other than the lowest level, the unenclosed vertical openings shall not serve as a required means of egress.
2. In Group I-2, atriums connecting three or more stories shall not require a 1-hour fire resistance rated construction when the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3, and all of the following conditions are met:
   - 2.1. For other than existing approved atriums with a smoke control system, where the atrium was constructed and is maintained in accordance with the code in effect at the time the atrium was created, the atrium shall have a smoke control system that is in compliance with Section 909; and,
   - 2.2. Glass walls forming a smoke partition or a glass-block wall assembly shall be permitted when in compliance with 2.2.1 or 2.2.2:
     - 2.2.1. Glass walls forming a smoke partition shall be permitted where all of the following conditions are met:
       1. Automatic Sprinklers are provided along both sides of the separation wall and doors, or on the room side only if there is not a walkway or occupied space on the atrium side.
       2. The sprinklers shall not be more than 12 inches away from the face of the glass and at intervals along the glass of not greater than 72 inches.
       3. Windows in the glass wall shall be non-operating type.
       4. The glass wall and windows shall be installed in a gasket frame in a manner that the framing system deflects without breaking (loading) the glass before the sprinkler system operates.
       5. The sprinkler system shall be designed so that the entire surface of the glass is wet upon activation of the sprinkler system without obstruction.
     - 2.2.2. A fire barrier is not required where a glass-block wall assembly complying with Section 2110 of the International Building Code and having a 3/4-hour fire protection rating is provided.
   - 2.3. Where doors are provided in the glass wall, they shall be either self-closing or automatic-closing and shall be constructed to resist the passage of smoke.

Commenter's Reason: Based on the input from the committee and interested parties, the AHC and CTC present the revised proposal above. The intent of this change is to appropriately address floor openings in existing construction. Today a conflict exists in the code, the building code would allow you to construction a floor opening without a 1 hour fire barrier in certain specific cases. The fire code would then tell you that approval is void and unilaterally require a 1 hour rating around all openings. This also impacts all historical non-rated floor openings that have been reviewed, approved and maintained. Practically we believe that this is not being enforced today and may be a reason why many jurisdictions do not adopt this chapter of the IFC. To set an appropriate retroactive standard, we believe the code should consider the historical context of the model codes. Unrated vertical openings have been allowed in hospitals and nursing homes previously. Atriums have been installed with various types of smoke venting and removal systems over the past few decades. The AHC has attempted to determine the general requirements that have been broadly used through these versions of codes. If we set the requirements based on the current version of the IBC, the facilities will constantly be tearing out existing, compliant construction to upgrade to new requirements. The federal regulations governing hospitals and nursing homes have used a retroactive standard similar to the one above for the past 10 years. Through our experiences with facilities during that period of time, we believe that the requirements listed above are reasonably consistent with that action.

In regards to the sprinkler question, currently all Group I-2 fire areas are required to have sprinklers retroactively per Chapter 11 of this Code. In Dallas, a code change was accepted to provide sprinkler protection throughout the building by a date certain provided by the adopting jurisdiction. The code change here was modified to state that the atrium option can be used if the "building is equipped throughout".

Public Comment 2:

Robert J Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IFC 1103.4.1 Group I occupancies. In Group I and I-3 occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

> **Exception** ~~**Exceptions:**~~ Atriums constructed in accordance with the code in effect at the time the atrium was created and which include automatic fire suppression, fire detection, alarm notification, and smoke control system protection. The atrium shall have been maintained in accordance with manufacturer's instructions and in accordance with the fire code in effect during occupancy of the atrium.

1. ~~In Group I-2 Condition 2 equipped throughout with an automatic sprinkler system, vertical opening connecting two or more stories need not be protected with 1-hour fire-resistance-rated construction where both of the following conditions are met:~~
   ~~1.1. The atrium volume is accounted for in the design of a smoke control system in accordance with Section 909.~~
   ~~1.2 The floor levels within the vertical opening shall contain only low or ordinary fire hazard uses.~~
2. ~~In Group I-2 Condition 2, where an automatic sprlnkler system is installed in accordance with Section 404.6 of the *International Building Code,* glass walls shall be considered to be equivalent to 1-hour fire-resistance-rated construction for purposes of this section. Where glass doors are provided in the glass wall, they shall be either self-closing or automatic-closing.~~
3. ~~In Group I-2 Condition 2, 1-hour fire-resistance-rated construction is not required where a glass-block wall assembly complying with Section 2110 of the *International Building Code* and having a ¾-hour fire protection rating is provided.~~

Commenter's Reason: Though testimony on the floor and the committee reason statement point to the acceptable level of protection being the current requirements for atriums in Section 404.0 of the International Building Code; the intent of Chapter 11 of the fire code is to be applied to buildings not in compliance with the International Building Code.

Since the target is an existing atrium, the atrium may have been designed and constructed to earlier editions of the International Building Code or in accordance with one of the legacy codes. The suggested replacement wording will provide for recognition of an atrium regardless of which code it was constructed under as long as it has been properly maintained during the life of the atrium.

When atriums were introduced as a design feature in the legacy codes, the fire protection required included automatic fire suppression systems, fire detection systems, alarm notification appliances, smoke control systems and separation from connecting floors that were not provided for in the design of the smoke control system. Those protection features are included in this proposal to make it clear they must not only be present, but must have been properly maintained as well. The intent is also to make it clear that you cannot take what was once considered an "open well" under legacy codes and rename it an atrium for application of this exception. To apply this exception the atrium would have had to have been designed and constructed pursuant to all of the requirements for an atrium after the design feature was added to the legacy codes and contain all of the listed fire protection features.

Section 1103.4.1 has been modified by the addition of the I-3 group designation to be consistent with F217 approved by the committee.

Public Comment 3:

Vickie Lovell, Intercode, Inc., representing Fire Safe North America, formerly known as Alliance For Fire and Smoke Containment and Control, requests Disapproval.

Commenter's Reason: In Dallas, there was much testimony from the floor pointing out the serious flaws with this proposal. The proposal seeks to grandfather existing atrium spaces, but it does it so by cherry-picking some of the atrium requirements that have historically applied as a whole package. This proposal allows compliance with only a small portion of the requirements found with current and legacy codes.

Testimony on the floor and the comments from the International Fire Code Committee members regarding Exception #1 coalesced around a simply reference to Section 404.0 Atriums in the International Building Code as the appropriate level of protection. However, from a practical standpoint, even that solution would not work for an exception to the fire code requirement for a 1 hour fire resistance rated construction. A review of the legacy codes versus the current IBC will document that the requirements for the installation of smoke control systems in older buildings have vast differences from systems designed to the current IBC 909 requirements. Existing smoke control systems designed and installed in accordance with some legacy codes would require completely new designs and major upgrades that will present practical difficulties, therefore making exception #1 impractical and effectively useless as a code requirement. Some of the same practical difficulties would also be presented for those older atrium spaces without smoke control systems that this proposed exception would apply to.

If the building and smoke control system are not designed to work together as a building system, there will be practical difficulty installing required exhaust inlets and ductwork, make-up air inlets and openings, locating exhaust fans, load carrying capability of the structure, capability of the building power supply including the available emergency power to handle the load of the newly installed or increased number of fans in an older building. Specialists in the smoke control field know that if the design is not correct or the design is not properly followed in a newly constructed building, problems with the smoke control system discovered near the end of the job are very difficult to correct due to practical issues.

Exception #2 is a woefully inadequate description of the correct use of sprinklers in combination with a glass wall as an alternative to a 1-hour fire rated assembly. ICC ES recently reissued revised acceptance criteria (AC385 - Acceptance Criteria for Special-purpose Sprinkler Heads Used with Fixed Glazed Assemblies to Provide a Fire-resistance-rated Wall Assembly) for the use of sprinklers and glazed assemblies. The acceptance criteria contain a detailed description of how the glass assembly is to be constructed and how the sprinklers are to be placed. It also clarifies some of the limitations as to the appropriate use of this type of assembly as an alternative (not an equivalent) to a fire resistance rated assembly. This exception applies everywhere and anywhere in I-2 Condition 2 facilities, which is not consistent with AC 385.

As an interested party, I monitored the discussion of the ICC Ad Hoc on Health Care on the public comment, and was not satisfied that the public comment would adequately resolve these concerns. The proposed exceptions in this proposal, including the further modifications by the proponent, are completely inadequate. A reference to Section 404.0 Atriums as a solution will introduce complexity and difficulties that cannot be overcome in most if not all cases. The committee decision to disapprove should be upheld.

F218-13

Final Action: AS AM AMPC____ D

F222-13
1103.5.3 (New), Table 1103.1

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

1103.5.3 Group A-2. An automatic sprinkler system shall be installed in accordance with Section 903.3.1.1 throughout existing buildings or portions thereof used as Group A-2 occupancies with an occupant load of 300 or more.

Table 1103.1
OCCUPANCY AND USE REQUIREMENTS

Section	Use			Occupancy Classification																		
				A	B	E	F	H-1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
1103.5.3	-	-	-	R[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(Portions of table not shown remain unchanged)

a. Only applies to Group A-2 occupancies

Reason: This requirement implements the Recommendation #1 included in the NIST Report of the Technical Investigation of The Station Nightclub Fire (NIST NCSTAR 2: Vol. I). *Recommendation 1* of the NIST report states:

> "Model codes should require sprinkler systems for all new and existing nightclubs regardless of size."

There is a list of fires in Group A-2 occupancies. This list includes the Station Nightclub, Beverly Hill Supper Club, the Coconut Grove and others. Each of these fires have resulted in a significant loss of life.

Group A-2 occupancies involve conditions such as large occupant loads, high occupant density, significant fuel loading and moveable furnishings and decorations. Group A-2 occupancies also include the potential for reduced lighting levels, high noise levels, combustible decorations, strobe and flashing lights, alcohol consumption, and confusing egress paths. Each of these alone can be a significant issue, but when combined they lead to the inability of the occupants to promptly and safely exit the building under fire conditions.

This proposal considers the arrangement of the IBC occupancy classifications and the inclusion of other uses in addition to nightclubs within the Group A-2 classification. Therefore, this proposal does not reach as far as the recommendation from NIST. While the NIST proposal recommends fire sprinklers in ALL facilities, this proposal will require existing Group A-2 occupancies to be retrofit with a fire sprinkler system only if the occupant load exceeds 300. Setting the threshold at 300 occupants will place the requirement where the higher potential for loss of life exists.

The proposed section only requires that the Group A-2 occupancy is provided with a fire sprinkler system. The section does not require the entire fire area to be protected, nor does it require the entire floor to be protected. The fire sprinkler system would be installed in the portion of the building which contains the Group A-2 occupancy.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Cost Impact: The code change will not increase the cost of new construction, but it will create a cost for existing unsprinklered buildings classified as Group A-2.

1103.5.3 (NEW) #1-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the code change based on the proponent's reason statement and because there is a fire history in Group A-2 occupancies. While the committee felt that the scope of sprinkler protection was adequately stated, it was suggested that the scope could be better defined in the public comment phase.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE 903.2.11.6
ADDITIONAL REQUIRED FIRE SUPPRESSION SYSTEMS

1103.5.3	Existing Group A-2 occupancies

1103.5 Sprinkler systems. An automatic sprinkler system shall be provided in existing buildings in accordance with Sections 1103.5.1 through ~~and 1103.5.2~~ 1103.5.3.

1103.5.3 Group A-2. An automatic sprinkler system shall be installed in accordance with Section 903.3.1.1 throughout existing buildings or portions thereof used as Group A-2 occupancies with an occupant load of 300 or more that serve alcoholic beverages.

Section	Use			Occupancy Classification																		
				A	B	E	F	H-1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
1103.5.3	-	-	-	R[~~a~~b]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

~~a~~ b. Only applies to Group A-2 occupancies that serve alcoholic beverages.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Although Item F222-13 was approved as submitted by the code development committee, comments offered at the Dallas hearing warranted further consideration. As a result, the Fire Code Action Committee, as the original proponent, recommends some additional changes, as follows:

1. A cross reference to new Section 1103.5.3 has been added to Table 903.2.11.6 and Section 1103.5.
2. The footnote in Table 1103.1 has been corrected to (b), since there is an existing (a).
3. The sprinkler retrofit requirement has been targeted to only apply to Group A-2 occupancies that serve alcoholic beverages, which reduces the original scope of the change that affected all Group A-2 occupancies. This is felt to be more in line with the NIST recommendations that were made following the Station Nightclub fire recognizing that intoxication of patrons plays a significant role in the potential risk of injury or loss of life in the event of a fire. In addition, limiting the scope of the change to only those occupancies that serve alcoholic beverages allows a connection to licensing laws that jurisdictions typically have in place for sale of such beverages. Such licensing laws, where they apply, will provide significant leverage for jurisdictions to be able to effectively enforce the requirement for a fire sprinkler system as a condition of being code compliant and issuance of a license.

Public Comment 2:

Tim Ryan, representing The International Association of Building Officials, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

APPENDIX K
GROUP A-2 OCCUPANCIES - RETROACTIVE AUTOMATIC SPRINKLER REQUIREMENT

K101.1 Scope. An automatic sprinkler system shall be installed in existing buildings in accordance with this appendix.

K101.2 Group A-2. An automatic sprinkler system shall be installed in accordance with Section 903.3.1.1 throughout existing buildings or portions thereof used as Group A-2 occupancies with an occupant load of 300 or more.

Commenter's Reason: The International Association of Building Officials believes that retroactive requirements for A-2 occupancies is overly restrictive and can financially penalize business owners. Mandatory, retroactive requirements for existing buildings that were previously permitted, inspected and properly maintained should be a jurisdictional choice and not be the minimum recognized standard in a model code. Deletion of chapter 11 provisions is a common practice by jurisdictions when adopting the IFC. By locating these provisions into the appendices it allows for enhanced due process for deliberating on such changes. This proposal is being made to be consistent with IFC Committee Action on F223, 224 and F347 related to R-1 occupancies.

F222-13
Final Action: AS AM AMPC____ D

F226-13
1103.5.3 (New)

<u>Proposed Change as Submitted</u>

Proponent: Thomas G. Daly representing The Hospitality Security Consulting Group, LLC

Add new text as follows:

<u>**1103.5.3 Group R-1 hotels and motels.** An *automatic sprinkler system* shall be provided throughout existing Group R-1 hotels and motels.</u>

> <u>**Exception:** Group R-1 hotels and motels of one story in height where all individual guestrooms and contiguous attic and crawl spaces are separated from each other and public and common areas by at least 1-hour fire partitions and each individual guestroom has an exit directly to a public exit court or yard.</u>

Reason:

A. Background: In the United States civilian fire deaths in Group R-1 hotels and motels over the past two decades have occurred exclusively in non-sprinklered and multi-story low-rise hotels/motels as predicted by the hotel industry. Notable National Fire Protection Association (NFPA) *and/or* media reported multiple loss of life low-rise hotel/motel fires include:
   1. Fontana Hotel - Miami Beach, FL - three stories - 9 civilian fire deaths - *4/6/1990*
   2. Paxton Hotel- Chicago, IL - four stories - 21 civilian fire deaths - *3/23/1993*
   3. Howard Johnson Hotel - Bowling Green, KY - two stories - 4 civilian deaths -*1/6/1996*
   4. Comfort Inn Hotel- Greenville, SC - three stories - 6 civilian deaths - *1/25/2004*
   5. Mason Hotel- San Diego, CA - three stories - 2 civilian deaths - *12/17/2004*
   6. Mitzpah Hotel- Reno, NV - three stories -12 civilian deaths -*10/31/2006*
   7. Zanzibar Motel- Reno, NV - two stories - 2 civilian deaths -*12/10/2007*
   8. Days Inn Hotel- Hoover, AL - two stories - 4 civilian deaths - *1/16/2010*

   Civilian fire deaths in hotels/motels averaged 7.7 per 1000 fires with no automatic suppression system present for the 1994-1998 timeframe. Civilian fire deaths in hotel/motel fires averaged11 each year from 2003-2007"- Civilian fire injuries in hotel/motel fires averaged 151 per year for the period 2003-2007.4

B. Code provisions remain inadequate to address hazard. Despite firesafety improvements for existing buildings mandated by the IFC starting in 20005 those changes have not resulted in a reduction in the annual civilian fire death statistics in nonsprinklered hotels/motels. Comparatively, no fire civilian fire deaths have been reported in sprinklered Group R-1 hotels/motels. After a decade of these codes changes fire deaths and injuries continue to occur in low-rise non-sprinklered Group R-1 hotels/motels. Without further code enhancements for existing hotels/motels, this carnage will continue. As such, a 'distinct hazard' continues to be present to occupants of non-sprinklered Group R-1 hotels and motels with regard to fires therein.

C. Cost/benefits: The U.S. lodging industry has largely completed the mostly voluntary sprinkler retrofitting of existing high-rise hotels, an effort which resulted in zero fire fatalities over the past two decades in such hotels? Leading lodging operators and franchisors including Hilton, Marriott and Starwood have also completed the sprinkler retrofitting of their low-rise hotels, dispelling the myth that such retrofit costs are prohibitive. Those costs are no more expensive than the routinely scheduled replacement of furnishings, fixtures and equipment (FF&E) including mattresses, case goods, carpeting, draperies and wall covering done by the industry. A hotel/motel sprinkler retrofit project is a one-time capital cost whereas the replacement of FF&E is a continuing periodic capital cost which the industry routinely bears. A hotel/motel sprinkler retrofit provides for a reduction in property insurance premiums and reduces the risk to firefighters engaged in fire suppression activities therein. As a result of these sprinkler system retrofits none of those cited hotel chains has experienced a civilian fire fatality in any of their hotels in the last two decades. Nonetheless, some lodging chains and many independent low-rise hotel owners/operators have not taken the same proactive action to protect their guests. The cost of such retrofits for commercial buildings including hotels and motels has been mitigated significantly by the permitted use of NFPA 13R as the installation standard for residential occupancies of 4 stories and less, the use of listed CPVC pipe in lieu of steel pipe or copper tube, the use of extended coverage sprinklers, the lack of the need in most cases for a fire pump in low rise Group R-1 buildings and through tax incentives in the forms of grants, tax credits, tax deductions and/or low interest loans for doing so see, for examples, state statutes in Alaska, South Carolina 10 and California 11 as well as numerous local ordinances.

Summary: Existing IFC provIsions have failed to prevent hotel/motel fire fatalities and thus a 'distinct hazard' to Group R-1 hotel and motel occupants continues to exist. The code change proposed herein, if adopted, will eliminate the 'distinct hazard' to life for such occupants.

Bibliography:

1. Tri-Data Corporation, Arlington, VA*., 'A Review of the Validity of Estimates of Hotel and Motel Fire Deaths – Final Report'*, December 1994, pg. 23.
2. Ahrens, Marty – National Fire Protection Association*, 'U.S. Fires in Selected Occupancies – Hotels and Motels*, March 2006, p. 103.

3. Flynn, Jennifer D. – National Fire Protection Association, *'U.S. Fires in Selected Occupancies – Hotels and Motels*, March 2010, Table 2.
4. Ibid., Table 1
5. See, for example, 2000 IFC Sec. 907.3.1.6 mandating fire alarm systems in existing hotels of more than 20 guestrooms regardless of height or exiting arrangements and multiple provisions of the 2009 IFC Sec. 4603.5 for Group R-1 occupancies.
6. Op cit., Ahrens, Marty NFPA *U.S. Fires in Selected Occupancies – Hotels and Motels 2006*, page 103.
7. NFPA Journal, September-October 2010, p 12.
8. See, for example, 2003 IFC Sec. 903.3.1.2 and 2003 IBC Sec. 903.3.1.2.
9. Alaska Statutes, Article 45.81.200-210.
10. South Carolina Act 357 (2008), R385, H4470 AN ACT TO AMEND THE CODE OFLAWS OFSOUTH CAROLINA, 1976, BY ADDING SECTION 58-5-390 SO AS TO PROVIDE THAT A PUBLIC OR PRIVATE UTILITY MAY NOT IMPOSE A TAP FEE, RECURRING MAINTENANCE FEE, OR OTHER FEE, HOWEVER DESCRIBED FOR THE INSTALLATION AND MAINTENANCE OF A FIRE SPRINKLER SYSTEM THAT EXCEEDS THE ACTUAL COSTS ASSOCIATED WITH THE WATER LINE TO THE SYSTEM AND TO DEFINE ACTUAL COSTS; BY ADDING SECTION 12-6-3622 SO AS TO ALLOW A PROPERTY TAX CREDIT, AT THE OPTION OF THE PROPERTY-TAXING ENTITY FOR TWENTY-FIVE PERCENT OF THE COSTS OF INSTALLING A FIRE SPRINKLER SYSTEM IN A COMMERCIAL OR RESIDENTIAL STRUCTURE WHEN SUCH INSTALLATION IS NOT REQUIRED BY LAW, TO ALLOW AN INCOME TAX CREDIT IN THE AMOUNT OF THE PROPERTY TAX CREDIT, TO PROVIDE THE MANNER IN WHICH THESE CREDITS ARE USED WHEN EARNED BY PASS-THROUGH ENTITIES, AND TO MAKE UNUSED CREDITS TRANSFERABLE BY THE STRUCTURE'S OWNER TO A TENANT; TO AMEND SECTION 12-37-3130, AS AMENDED, RELATING TO DEFINITION S FOR PURPOSES OF THE SOUTH CAROLINA REAL PROPERTY VALUATION REFORM ACT, SO AS TO PROVIDE THAT THE INSTALLATION OF A FIRE SPRINKLER SYSTEM IN A COMMERCIAL OR RESIDENTIAL STRUCTURE WHEN THE INSTALLATION IS NOT REQUIRED BY LAW IS NOT AN ADDITION OR IMPROVEMENT; BY ADDING SECTION 10-1-80 SO AS TO PROHIBIT ENFORCEMENT OF THAT PORTION OF THE INTERNATIONAL FIRE CODE OR NATIONALLY RECOGNIZED FIRE CODE THAT PROHIBITS THE USE OF NATURAL CUT TREES IN CELBRATIONS IN HOUSES OF WORSHIP; AND TO AMEND SECTION 12-37-220, AS AMENDED, RELATING TO PROPERTY TAX EXEMPTIONS, SO AS TO EXEMPT THE VALUE OF FIRE SPRINKLER SYSTEM EQUIPMENT INSTALLED IN A COMMERCIAL OR RESIDENTIAL STRUCTURE WHEN THE INSTALLATION IS NOT REQUIRED BY LAW AND TO PROVIDE THAT THIS EXEMPTION APPLIES UNTIL THE PROPERTY UNDERGOES AN ASSESSABLE TRANSFER OF INTEREST.
11. California Constitution Article 13A Tax Limitation Sec. 2(c)(2) & Taxation & Revenue Code Sec. 74(a)-(e)

Cost Impact: The proposal will increase the cost of construction.

1103.5.3 (NEW)-F-DALY

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The disapproval was based on the committee's judgment that the cost-benefit analysis does not justify the code change. It was also felt that the exception would unreasonably limit the exit discharge to the defined areas of an "exit court" or "yard" and that the change could be financially onerous for small lodging operations. It was suggested that the proposal should be revised to increase the threshold to more than one story.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Thomas G. Daly, representing The Hospitality Security Consulting Group, LLC, requests Approval as Submitted.

Commenter's Reason: Code Change proposal F-226-13 will end the fire risk to life in low-rise non-sprinklered hotels and motels and is not cost prohibitive as evidenced by the thousands of such existing hotel owners/operators who have retrofitted their facilities with automatic sprinkler systems.

Public Comment 2:

J. William Degnan, President, representing National Association of State Fire Marshals, requests Approval as Submitted.

Commenter's Reason: NASFM disagrees with the cost-benefit analysis by the committee. The proponent provides valid justification and support for this proposal, as shown by both civilian and firefighter deaths. The increased fuel loads and synthetic materials have greatly changed the rate and size at which the fire spread. Less than a year ago, 4 Houston firefighters were killed in a low rise motel fire. We support the need to address the court or yard exit.

Public Comment 3:

Jonathan Dunaway, Clark County (WA) Fire Marshal's Office, representing Washington State Association of Fire Marshals; Robert Marshall representing California Fire Chiefs, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

1103.5.3 Group R-1 hotels and motels. An *automatic sprinkler system* shall be provided throughout existing Group R-1 hotels and motels that are three stories or more in height as measured from the lowest level of fire department access.

> ~~**Exception:** Group R-1 hotels and motels of one story in height where all individual guestrooms and contiguous attic and crawl spaces are separated from each other and public and common areas by at least 1-hour fire partitions and each individual guestroom has an exit directly to a public exit court or yard.~~

Commenter's Reason: This proposal addresses the committee's concerns that the threshold b more than one story and better justifies the existing Group R-1 hotels and motels three or more stories are beyond the reach of ground ladders for firefighting operations.

F226-13

Final Action: AS AM AMPC____ D

F228-13
1103.7.6

Proposed Change as Submitted

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

1103.7.6 Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 *dwelling* or *sleeping units.*

Exceptions:

1. Where each living unit is separated from other contiguous living units by *fire barriers* having a *fire-resistance rating* of not less than 0.75 hour, and where each living unit has either its own independent *exit* or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an *approved* supervised *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 and having a local alarm to notify all occupants.
3. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units* and are protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, provided that *dwelling units* either have a *means of egress* door opening directly to an exterior *exit access* that leads directly to the *exits* or are served by open ended *corridors* designed in accordance with Section 1026.6, Exception 4.
4. <u>A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units*, do not exceed 3 stories in height and comply with all of the following:</u>
   <u>4.1 Each *dwelling unit* is separated from other contiguous *dwelling units* by *fire barriers* having a *fire-resistance rating* of not less than ¾ hour</u>
   <u>4.2 Each *dwelling unit* is provided with interconnected smoke alarms complying with Section 907.2.11 in all sleeping rooms, plus not less than one hardwired smoke alarm in the common area of each floor or mezzanine level. Interconnection shall be permitted to be hardwired or by listed smoke alarms with wireless interconnect capability</u>

Reason: The proposal provides a reasonable alternative to retrofitting a manual fire alarm system in existing Group R-2 occupancy buildings not exceeding three stories in height and having exits that lead directly to the outside. Fire risk in apartments tends to be greatest for occupants inside the dwelling unit where a fire originates, and money spent to retrofit firesafety equipment in apartments is better spent within dwelling units, as opposed to common areas.

Countless existing apartment buildings have only a single smoke alarm in the common area, and the IFC does not require retrofitting of smoke alarms in sleeping rooms when such alarms weren't required at the time of construction. The lack of smoke alarms in bedrooms, and particularly the lack of interconnecting alarm signals, increases the risk of injury or death in a unit of fire origin and other units that experience smoke infiltration. An additional consequence may be delayed recognition of a fire event, which increases the risk of harm to other building occupants and may delay notification of the fire department.

The alternative of a manual fire alarm system is less beneficial from a safety perspective because it requires an occupant to detect a fire event (which may take more time with fewer smoke alarms) and then find and activate a pull stations. Occupants must then respond to the alarm signal, and with the history of false alarms associated with manual fire alarm systems in apartment buildings, a response without other indications of a fire is questionable.

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

1103.7.6-F-SHAPIRO

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent that the code change will provide an increased level of life safety in an economical fashion for existing Group R-2 buildings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing National Multi Housing Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1103.7.6 Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 *dwelling* or *sleeping units.*

Exceptions:

1. Where each living unit is separated from other contiguous living units by *fire barriers* having a *fire-resistance rating* of not less than 0.75 hour, and where each living unit has either its own independent *exit* or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an *approved* supervised *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 and having a local alarm to notify all occupants.
3. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units* and are protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, provided that *dwelling units* either have a *means of egress* door opening directly to an exterior *exit access* that leads directly to the *exits* or are served by open ended *corridors* designed in accordance with Section 1026.6, Exception 4.
4. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units*, do not exceed 3 stories in height and comply with all of the following:
   - 4.1 Each *dwelling unit* is separated from other contiguous *dwelling units* by *fire barriers* having a *fire-resistance rating* of not less than ¾ hour
   - 4.2 Each dwelling unit is provided with <u>smoke alarms complying with the requirements of Section 907.2.11.</u> ~~interconnected smoke alarms complying with Section 907.2.11 in all sleeping rooms, plus not less than one hardwired smoke alarm in the common area of each floor or mezzanine level. Interconnection shall be permitted to be hardwired or by listed smoke alarms with wireless interconnect capability~~

Commenter's Reason: After the committee approved this proposal, questions were raised regarding the clarity of the requirements in Item 4.2. In reviewing those concerns, it seems to make better sense to simply reference the installation requirements that apply to new construction in Section 907.2.11. The basic logic of the original proposal, which was approved without opposition at the committee hearing with a 14:0 vote, continues to apply. Retrofitting interconnected smoke alarms into all sleeping rooms in existing dwelling units is preferable to a manual fire alarm system for buildings that do not have interior corridors and do not exceed 3 stories in height.

It should be noted that the requirement in Section 1103.7.6 have been in the code for quite some time. Any jurisdiction intending to enforce the existing manual fire alarm requirement has already had several years to adopt and apply that requirement. In those jurisdictions that have not yet been able to enact a retroactive fire alarm requirement, this exception provides an alternative solution that greatly increase safety and has the support of the National Multi Housing Council.

Public Comment 2:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1103.7.6 Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 *dwelling* or *sleeping units.*

Exceptions:

1. Where each living unit is separated from other contiguous living units by *fire barriers* having a *fire-resistance rating* of not less than 0.75 hour, and where each living unit has either its own independent *exit* or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an *approved* supervised *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 and having a local alarm to notify all occupants.
3. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units* and are protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, provided that *dwelling units* either have a *means of egress* door opening directly to an exterior *exit access* that leads directly to the *exits* or are served by open ended *corridors* designed in accordance with Section 1026.6, Exception 4.
4. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units*, do not exceed ~~3~~ 2 stories in height and comply with all of the following:
   4.1 Each *dwelling unit* is separated from other contiguous *dwelling units* by *fire barriers* having a *fire-resistance rating* of not less than ¾ hour
   4.2 Each *dwelling unit* is provided with hard wired interconnected smoke alarms as required for new construction in Section 907.2.11. ~~Each *dwelling unit* is provided with interconnected smoke alarms complying with Section 907.2.11 in all sleeping rooms, plus not less than one hardwired smoke alarm in the common area of each floor or mezzanine level. Interconnection shall be permitted to be hardwired or by listed smoke alarms with wireless interconnect capability~~

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This public comment addresses two concerns with the proposal. First, it was felt that providing this exception for three story R-2 occupancies was not justified due to the risk associated with evacuating occupants from such a building without the benefit of a manual fire alarm system. The increased risk to occupants on the third floor necessitate the need for a manual fire alarm system that would provide early warning to all occupants when a fire on the first floor could block egress from the two floors above. Evacuating occupants from a two story building does not pose as great of a risk.

Essentially this exception, approved as submitted, would remove the requirement to retroactively install a manual fire alarm system by only installing a battery-powered smoke alarm in each sleeping room of a three story building. .

Second, the wording included in exception 4.2 was very confusing, including the reference to a 'common area' in buildings that do not contain interior corridors, the references to how interconnection is to be provided, and requiring hard wiring for just the smoke alarm in the 'common area'.

F228-13

Final Action: AS AM AMPC____ D

F229-13
1103.8.1

Proposed Change as Submitted

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1103.8.1 Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*, except as ~~provided~~ required in Sections 1103.8.2. ~~and~~ or 1103.8.3.

Reason: The provisions of 1103.8.2 and 1103.8.3 aren't exceptions, but additional requirements for interconnection and power source for specific applications. Each of these two sections can be applied independently without connection to one another.

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

1103.8.1-F-COLLINS-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

1103.8.1 Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*~~, except~~ as required in Section~~s~~ 1103.8.2 or 1103.8.3.

Committee Reason: The committee agreed with the proponent that the code change provides a needed clarification of the text. The modification further clarifies that the two cited sections are requirements rather than exceptions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment :

Jeffrey M. Shapiro, P.E., International Code Consultants, representing National Multi Housing Council, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

1103.8.1 Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*~~,~~. Interconnection and power sources shall be in accordance with ~~as required in~~ Sections 1103.8.2 ~~or~~ and 1103.8.3.

Commenter's Reason: The committee approved text isn't entirely clear since Sections 1103.8.2 and 1103.8.3 are only supplemental to the basic requirement of complying with Section 907.2.11. The proposed revision clarifies this point. No technical change is intended.

F229-13
Final Action: AS AM AMPC____ D

F239-13
1105.3 (New); 202 (New)

Proposed Change as Submitted

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Add new text as follows:

IFC SECTION 1105
CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.3 Corridor construction. In Group I-2, in areas housing patient sleeping or care rooms, corridor walls and the opening protectives therein shall provide a barrier designed to resist the passage of smoke in accordance with Sections 1105.3.1 through 1105.3.7.

1105.3.1 Materials. The walls shall be of materials permitted by the building type of construction.

1105.3.2 Fire-resistance rating. Unless required elsewhere in the code, corridor walls are not required to have a fire-resistance rating.

1105.3.3 Corridor Walls Continuity. Corridor walls shall extend from the top of the foundation or floor below to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a ceiling above where the ceiling membrane is constructed to limit the passage of smoke.
3. The underside of a lay-in ceiling system where the ceiling tiles weigh at least one pound per square foot of tile.

1105.3.4 Openings in corridor walls. Openings in corridor walls shall provide protection in accordance with 1105.3.4.1 through 1105.3.4.3.

1105.3.4.1 Windows. Windows in corridor walls shall be sealed to limit the passage of smoke, or the window shall be automatic closing upon detection of smoke, or the window opening shall be protected by an automatic closing device that closes upon detection of smoke.

Exception: In smoke compartments not containing patient sleeping rooms, pass-through windows or similar openings shall be permitted in accordance with Section 1105.3.4.3.

1105.3.4.2 Doors. Doors in corridor walls shall comply with Sections 1105.3.4.2.1 through 1105.3.4.2.3.

1105.3.4.2.1 Louvers. Doors in corridor walls shall not include louvers, transfer grills or similar openings.
Exception: Doors shall be permitted to have louvers, transfer grills or similar openings at toilet rooms or bathrooms; storage rooms that do not contain storage of flammable or combustible material; and storage rooms that are not required to be separated as incidental uses.

1105.3.4.2.2 Corridor doors. Doors in corridor walls shall limit the transfer of smoke by complying with the following:

1. Doors shall be constructed of not less than 1-3/4 inch (44 mm) thick solid bonded core wood or capable of resisting fire for a minimum of 1/3 hours.
   Exception: Corridor doors in buildings equipped throughout with an automatic sprinkler system.

2. Frames for side hinged swinging doors shall have stops on the sides and top to limit transfer of smoke.
3. Where provided, vision panels in doors shall be a fixed glass window assembly installed to limit the passage of smoke.Existing wired glass panels with steel frames shall be permitted to remain in place.
4. Doors undercuts shall not exceed 1 inch (25 mm).
5. Doors shall be positive latching with devices that resist not less than 5 pounds (22.2 N). Roller latches are prohibited.
6. Mail slots or similar openings shall be permitted in accordance with Section 1105.3.4.3.

1105.3.4.2.3 Dutch doors. Where provided, dutch doors shall comply with Section 1105.3.4.2.2. In addition, dutch doors shall be equipped with latching devices on either the top or bottom leaf to allow leaves to latch together. The space between the leaves shall be protected with devices such as astragals to limit the passage of smoke.

1105.3.4.2.4 Self- or automatic-closing doors. Where self- or automatic-closing doors are required, closers shall be maintained in operational condition.

1105.3.4.3 Openings in corridor walls and doors. Mail slots, pass through windows or similar openings shall not be required to be protected where the aggregate area of the openings between the corridor and a room are not greater than 80 square inches (51 613 mm^2) and are located with the top edge of any opening no higher than 48 inches above the floor.

1105.3.5 Penetrations. The space around penetrating items shall be filled with an *approved* material to limit the passage of smoke.

1105.3.6 Joints. Joints shall be filled with an *approved* material to limit the passage of smoke.

1105.3.7 Ducts and air transfer openings. The space around a duct penetrating a smoke partition shall be filled with an *approved* material to limit the passage of smoke. Air transfer openings in smoke partitions shall be provided with a *smoke damper* complying with Section 717.3.2.2 of the International Building Code.

> **Exception:** Where the installation of a *smoke damper* will interfere with the operation of a required smoke control system in accordance with Section 909, *approved* alternative protection shall be utilized.

1104.17 Corridors construction. Corridors serving an occupant load greater than 30 and the openings therein shall provide an effective barrier to resist the movement of smoke. Transoms, louvers, doors and other openings shall be kept closed or be self closing. In Group I-2, corridors in areas housing patient sleeping or care rooms shall comply with Section 1105.3.

Exceptions:

1. Corridors in occupancies other than in Group H ~~and I-2,~~ which are equipped throughout with an approved automatic sprinkler system.
2. ~~Patient room doors in corridors in occupancies in Group I-2 where smoke barriers are provided in accordance with the International Building Code.~~

~~3~~2. Corridors in occupancies in Group E where each room utilized for instruction or assembly has at least one-half of the required means of egress doors opening directly to the exterior of the building at ground level.

~~4~~3. Corridors that are in accordance with the *International Building Code*.

SECTION 202
GENERAL DEFINITIONS

DUTCH DOOR. A door divided horizontally so that the top can be operated independently from the bottom.

Reason: This change adds minimum requirements for existing Group I-2 into Chapter 11 by adding specific retrofit requirements. This change will move the existing retrofit requirements for corridors in I-2 occupancies to proposed new section 1105.3 and add more detailed specific requirements. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities as it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that provide a more uniform level of safety and eliminate many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

These provisions are written specifically for hospitals (Group I-2, Condition 2). These are retrofit requirements that provide a minimum level of safety considered necessary for patients, staff and first responders in an environment in which patients are in many instances not capable of self preservation and must be protected in place. The changes also provide tradeoffs for automatic sprinkler systems consistent with those allowed for new construction and also with those allowed by CMS. In no way does this affect the existing requirement that existing, approved construction must be maintained in the manner that it was approved. It simply provides a tool for evaluating historical construction techniques.

Specific points include:

- Existing corridor construction should primarily be evaluated for it's ability to resist or limit the transfer of smoke, regardless of the code at the time of construction.. Corridor walls, even if they were built 60 years ago, should be regularly assessed confirm that they minimize the transfer of smoke. This section describes some criteria by which this can be assessed.
- The requirements clearly indicate that portions of corridor walls required to have a fire resistance ratings by other code provisions must meet those provisions. This addresses where a corridor wall also happens to be a smoke barrier, incidental use area separation, etc.
- The Ad Hoc Committee added a specific section on dutch doors. Dutch doors have been used in health care facilities for many years for various necessary operational reasons. While existing language in the IBC does not specifically speak of dutch doors, their use is not prohibited but if used must meet the requirements contained in Section 407.3 including positive latching and limiting the transfer of smoke. This change will

provide clarity for existing installations by giving specific guidance on the minimum acceptable requirements including positive latching and smoke transfer for their use in corridor walls. A definition is provided for additional clarity.

- The Ad Hoc committee also proposes similar detail for doors, windows, louvers and other potential penetrations or openings in corridor walls in an attempt to add clarity to the intent of the code on limiting the transfer of smoke. These proposals are consistent with current CMS standards.
- There are exceptions that deal with existing mail slot, pass-through and similar openings that are commonly found in hospitals. These are needed for privacy, medication security and other operational needs. Our proposal places restrictions on these existing openings similar to the current federal requirements.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

1105.3 (NEW)-F-BALDASSARRA-WILLIAMS-ADHOC

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The committee agreed with the proponent that the code change reflects an important and needed coordination effort to correlate the IFC with Federal Center for Medicaid and Medicare Services (CMS) healthcare regulations with which all facilities must now comply and that it will eliminate costly conflicting requirements among different codes applicable to such facilities.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Aaron Johnson representing Patient Fire Safety Coalition, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1105.3.2 Fire-resistance rating. ~~Unless required elsewhere in the code, corridor walls are not required to have a fire-resistance rating.~~ Unless otherwise approved, corridor walls that were installed as fire-resistance rated assemblies in accordance with the applicable codes under which the building was constructed, remodeled, or altered shall be maintained as such, but shall at no time be permitted to be less than 1/2 hour rated.

1105.3.4.1 Windows. Windows in corridor walls shall be sealed to resist the free passage of smoke, or the window shall be automatic closing upon detection of smoke, or the window opening shall be protected by an automatic closing device that closes upon detection of smoke.

> **Exception:** In smoke compartments not containing patient sleeping rooms, unprotected pass-through windows or similar openings shall not be ~~permitted in accordance with Section 1105.3.4.3~~ required to be protected where the openings are not greater than 80 square inches (51 613 mm).

~~**1105.3.4.3 Openings in corridor walls and doors.** Mail slots, pass through windows or similar openings shall not be required to be protected where the aggregate area of the openings between the corridor and a room are not greater than 80 square inches (51 613 mm) and are located with the top edge of any opening no higher than 48 inches above the floor.~~

1105.3.5 Penetrations. The space around penetrating items shall be filled with an *approved* material to limit the free passage of smoke. Where the corridor wall is being maintained as a fire-resistance-rated assembly, penetrations shall be firestopped in accordance with Section 714 of the *International Building Code*.

1105.3.6 Joints. Joints shall be filled with an *approved* material to limit the free passage of smoke.

1105.3.7 Ducts and air transfer openings. The space around a duct penetrating a smoke partition shall be filled with an *approved* material to limit the free passage of smoke. Air transfer openings in smoke partitions shall be provided with a *smoke damper* complying with Section 717.3.2.2 of the International Building Code.

> **Exception:** Where the installation of a *smoke damper* will interfere with the operation of a required smoke control system in accordance with Section 909, *approved* alternative protection shall be utilized.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: The proposed requirement in 1105.3.2 for corridor walls that were mandated to be fire resistance rated at the time of original construction to have their fire rating maintained is consistent with other sections of this code (e.g. 107.1, 701.2). The relaxation to allow the fire resistance rating to be as low as ½ hour is consistent with NFPA 101 (19.3.6.2.2), which would therefore aid in the harmonization with the Life Safety Code that the AdHoc Healthcare Committee has been seeking. The additional new text relating to fire-rated corridors will help ensure that the code official does not overlook the need for possible fire ratings where the building was built or renovated with such rated walls.

Where the corridor walls do have a fire resistance rating, maintain their ability to stop the passage of fire and smoke despite having numerous penetrations for utilities and other through-penetrations would require those penetrations to be suitably sealed. Thus, 1105.3.5 is modified to point the user to the International Building Code, where detailed requirements are provided for the proper sealing of those penetrations.

The AdHoc Committee for Healthcare has stated that they are bringing forth these proposals to more closely align with CMS requirements. However, as CMS conducts life safety inspections based on NFPA codes and standards this change is not consistent with their stated desired alignment. NFPA 101:19.3.6.2.3 states, "Corridor walls shall form a barrier to limit the transfer of smoke." Other relevant sections of NFPA 101 restrict the usage of louvers in corridor doors and limit the clearance at the bottom of the doors to a maximum of 1 inch. The proposed unprotected 80 square inch unprotected openings are completely inconsistent with the NFPA 101 measures designed to keep smoke from traveling unimpeded between corridors and patient rooms.

Public Comment 2:

William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1105.3.3 Corridor Walls Continuity. Corridor walls shall extend from the top of the foundation or floor below to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a ceiling above where the ceiling membrane is constructed to limit the passage of smoke.
3. The underside of a lay-in ceiling system <u>where the ceiling system is constructed to limit the passage of smoke and</u> where the ceiling tiles weigh at least one pound per square foot of tile.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The intent is that the ceiling system, either the ceiling membrane (Item 2) or the lay-in ceiling system (Item 3), is required to limit the passage of smoke. The proposed revision merely clarifies that some type of open ceiling tile that happens to weigh one pound per square foot is not acceptable. Likewise, a ceiling system with openings serving a plenum would not be acceptable, even if the ceiling tiles weighed one pound per square foot.

Public Comment 3:

William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1105.3.2 Fire-resistance rating. Unless required <u>by Sections 1103 and 1104</u> ~~elsewhere in the code~~, corridor walls are not required to have a fire-resistance rating.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The intent is to provide a more specific reference for the user of the Code as to where one might find requirements for a fire-resistance rating for a corridor in a Group I-2 occupancy. Sections 1103 and 1104 both contain language regarding maintaining fire resistance ratings for corridors when the building was originally constructed with corridors having a fire resistance rating.

Public Comment 4:

William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1105.3.4.3 Openings in corridor walls and doors. <u>In other than smoke compartments containing patient sleeping rooms, m</u>~~M~~ail slots, pass through windows or similar openings shall not be required to be protected where the aggregate area of the openings between the corridor and a room are not greater than 80 square inches (51 613 mm^2) and are located with the top edge of any opening no higher than 48 inches above the floor.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: A similar provision existing in NFPA 101, *Life Safety Code*, and is based upon computer calculations of smoke flow through an opening. The calculations assumed a fire in a room adjacent to the corridor and the quantity of smoke that might flow into a corridor. The NFPA Life Safety Technical Committee on Health Care Occupancies did not consider the scenario where smoke may be in the corridor and the openings may allow the smoke to migrate into adjacent patient sleeping rooms. Using the "defend in place" philosophy, allowing such openings in a corridor wall could result in the need to evacuate or relocate more patients than anticipated and that relocation would be through a corridor in which there is considerable smoke. The smoke resistant separation between the corridor and the patient sleeping room should be maintained.

Public Comment 5:

Vickie Lovell, Intercode, Inc., representing Fire Safe North America, formerly known as Alliance For Fire and Smoke Containment and Control, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1105.3.2 Fire-resistance rating. Unless required ~~elsewhere in the~~ by Section 1104 of this code, or required by a previously approved code, corridor walls are not required to have a fire-resistance rating.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The intent of this code change is a useful addition to the fire code because it attempts to address very old building hospital designs that did not recognize the importance of containing smoke migration to a limited area, and leaves paths of egress such as corridors unprotected.

Although the current fire code does not require existing corridors to have a fire rating (only to limit smoke), legacy building codes did. There are a significant number of hospitals that are not sprinklered that maintain fire rated corridors.

The flaw with the proposal as currently written is that it could be interpreted to mean that ALL corridors (rated and non rated) in existing hospitals (sprinklered and un-sprinklered) can be modified to simply limit smoke.

Although Section 703.1 of the fire code could prevent an incorrect interpretation from occurring, this modification to the proposal clarifies that existing I-2s would continue to maintain the integrity of the fire resistance ratings of the corridors IF such ratings were required under this code or an older code to which the hospital was built. A public comment is submitted on F98 that fortifies the requirement for the maintenance provision of existing fire rated assemblies and fire protection ratings.

Public Comment 6:

John Valiulis, Hilti, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1105.3 Corridor construction. In Group I-2, in areas housing patient sleeping or care rooms, corridor walls and the opening protectives therein shall provide a barrier designed to resist the passage of smoke in accordance with Sections 1105.3.1 through 1105.3.7. Where the provisions of this section conflict with the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

1105.3.1 Materials. The walls shall be of materials permitted by the building type of construction.

1105.3.2 Fire-resistance rating. ~~Unless required elsewhere in the code, corridor walls are not required to have a fire-resistance rating.~~ Corridor walls shall be maintained to provide the fire resistance rating that was provided at the time of construction, unless approved otherwise.

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

~40% of hospitals are estimated to be unsprinklered

The latest statistics published by the NFPA (Fires in Healthcare Facilities, Ahrens, M., Nov 2012), covering the period 2006-2010, indicate that sprinklers were present in 55% of reported healthcare fires. Making the simplifying assumption that fires occur at about the same frequency in sprinklered and non-sprinklered buildings, this would mean that roughly 45% of hospitals are unsprinklered. Even with progress on sprinklering between 2010 and 2013 (which may have been minimal due to the recession), the percentage of unsprinklered hospitals can be safely assumed to be in the range of about 40%.

Fire code should be just as clear and easy to apply to all buildings, sprinklered and unsprinklered

Since the Fire Code applies to existing buildings, it must be written to allow clear and correct application of code mandates for buildings as they exist today. The wording developed for code change proposal F239, which only ever requires smoke resistance, and not fire resistance, therefore suitably covers the topic of corridor walls only if all hospitals were built with sprinklers. The provision of smoke resistance alone, without fire resistance, was never accepted by any of the legacy codes for corridor walls in unsprinklered healthcare facilities. Thus, the originally proposed wording for F239 did a disservice to the hope of proper code enforcement in existing hospitals, since the inspectors are likely to be dealing with unsprinklered hospitals about 40% of the time, and need some code sections to clearly and unambiguously allow them to enforce corridor fire resistance requirements (when applicable) for existing non-sprinklered hospitals.

1105.3.2 is revised to default to fire rating equal to that mandated at time of construction

Section 1105.3.2 therefore needs to provide some minimal guidelines to ensure that the corridor walls in non-spriinklered healthcare facilities are suitably verified to have the required fire resistance rating. The three legacy codes, plus NFPA 101, all required 1-hour rated corridors in unsprinklered hospitals for several decades prior to the advent of the IBC. It does a disservice to the novice fire inspector to start with the assumption in 1105.3.2 that "corridor walls are not required to have a fire resistance rating", which would likely be correct only about 60% of the time. Rather, the starting point would much more accurately be that the fire resistance of the corridor wall in an existing building will be as it was required to be in the code under which the building was built. Thus, 1105.3.2 is proposed to be revised to more broadly start with that statement, which would then be true for 100% of the corridor walls. If there was no building code or fire code requiring corridor fire resistance at the time of construction, then the various provisions listed here for smoke resistance would be the ones setting the minimum performance requirements.

New text at the end of Section 1105.3 makes it clear that original construction requirements are not superseded by the lower requirements here

The other revision proposed for F239 is the addition of a new sentence for the entire section 1105.3 on corridors, to state that where any of the numerous minimum construction requirements listed here (e.g. for doors, openings, penetrations, joints, ducts) conflict with the requirements that were in effect when the walls were originally built, that the most restrictive provision shall apply. This would then adequately cover the ~40% of healthcare facilities that are not sprinkler protected, and likely had some fire resistance requirements to meet within the corridor walls. This wording provides the language that the fire official needs to be able to reference in order to enforce the maintenance of the building to the level of fire safety that it was constructed, making it clear that the code requirements listed in this section do not create a new lower minimum level of performance for the existing construction. As is typical for the Fire Code, the provisions listed here provide minimum requirements to which a building would need to be upgraded if it had not already met the more stringent requirements of a previous code.

Many of the other articles proposed in code change proposal F239 could also benefit from a revision to indicate what the minimum requirements would be in the case where the corridor wall was built to comply with a fire resistance rating. However, the over-arching new text in Section 1105.3 avoids the need to do that, as it's a blanket statement that would apply to all of this proposed new section's requirements.

It may be argued that dealing with the corridor construction requirements for unsprinklered hospitals is unnecessary, as all hospitals are supposed to be sprinklered, and even if they are not today, that they all will be some year soon. With a substantial portion of hospitals not being sprinklered today, it certainly makes sense to include clear and consistent guidance for how to enforce fire code requirements for those buildings. However, if the percent unsprinklered ever dwindles to some insignificant percent in the future, then the fire code articles dealing with unsprinklered buildings could be proposed for removal from the IFC at that time.

Public Comment 7:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council (IFC), requests Disapproval.

Commenter's Reason: This proposal seeks to carve out a separate set of provisions for Group I-2 Hospitals that differs from how other occupancies are treated under Chapter 11. <u>This proposal appears to assume that the Group I-2 fire area is sprinklered, and therefore it offers design alternatives that are sprinkler tradeoffs in the IBC whether the facility is sprinklered or not.</u> This is highlighted in the proponents supporting statement, which indicates the following:

> "The changes also provide tradeoffs for automatic sprinkler systems consistent with those allowed for new construction and also with those allowed by CMS. **In no way does this affect the existing requirement that existing, approved construction must be maintained in the manner that it was approved.** It simply provides a tool for evaluating historical construction techniques."

According to the NFPA "Report on Fires in Health Care Facilities" published November 2012, between 2006 and 2010, Sprinklers were present in only 55% of reported health care fires[1]. The fact remains that many existing I-2 occupancies are not sprinklered throughout.

But, nowhere in this code section does it ever state that the building mist be sprinklered for this section to apply. Without a precondition that the facility be sprinklered before any of these design alternatives can be acceptable, this becomes an unprecedented reduction of hospital fire safety features.

This substantiation is not consistent with the proposed changes. As indicated in the preceding sentence, in this proposal, tradeoffs for automatic sprinkler systems consistent with those allowed for <u>new construction</u> and with those allowed by CMS are provided even if sprinklers are not installed. This is in conflict with the IBC and CMS requirements and would produce a level of protection that is clearly different than "the manner that it was approved". The proponents do not provide the Technical justification for many of these relaxations, and do not provide a review of other complimentary required features that would be omitted here, but required in new construction. Instead, the proponents cite a coordination effort to correlate the IFC with Federal Center for Medicaid and Medicare Services (CMS) healthcare regulations.

In addition, the requirements are too vague to allow consistent compliance and enforcement. Some examples are as follows:

1105.3.3 Corridor Walls - How does the Fire Official determine the weight of the ceiling tiles? Will he be measuring each tile on site? Also, the 1 lbs/sq. ft. minimum weight requirement comes from requirements for Fire Resistance Rated assemblies. No evidence has been provided that this bears any relationship to limiting the passage of smoke. According to industry representatives, the majority of Class A ceiling tiles sold in the US today would not meet the 1 lbs/sq. ft. threshold.

1105.3.4.2.2 Corridor doors - Item (1) indicates that doors may be "capable of resisting fire for a minimum of 1/3 hours". "Resisting fire" is not an enforceable term that would connect to any specific fire resistance or fire protection test. Does that mean they need a 1/3h fire protection rating per the IBC, or a 1/3 hour fire resistance rating, or is an adhoc onsite "match test" sufficient?

1105.3.4.3 Openings in corridor walls and doors - There is no justification provided for permitting 80 square inch unprotected openings for every single patient room for mail slots, pass through windows, or other similar openings. Hospital corridors have needed to be fire partitions per the legacy codes in unsprinklered facilities, and corridors are required to be smoke partitions in the IBC, capable of restricting the movement of smoke between patient rooms and the corridors. Allowing unprotected holes up to 80 square inches to exist in every single room's corridor wall would completely invalidate the effectiveness of either fire partition walls or smoke partition walls for the corridors. There has been no substation provided to show that the condition would be safe, nor has there been any effort to show some overwhelming need for such large, frequent and unprotected holes that would trump the need for fire safety.

Contrary to the tone of the proponents supporting statement, statistics show that fires do occur in Group I occupancies on a regular basis. According to the NFPA "Report on Fires in Health Care Facilities" published November 2012, between 2006 and 2010, U.S. fire departments responded to an estimated average of 6,240 structure fires in or on health care properties per year. These fires caused an average of six civilian deaths, 171 civilian injuries and $52.1 million in direct property damage annually. Almost half (46%) were at nursing homes, and almost one-quarter (23%) were in hospitals or hospices. To put these numbers into a larger perspective, during 2006-2010, the 6,240 **fires in health care properties accounted for 1.2% of the 506,400 structure fires in the US[1].**

1 Source: NFPA "Fires in Health Care Facilities" Author: Marty Ahrens Issued: November 2012, National Fire Protection Association Fire Analysis and Research Division

Public Comment 8:

Aaron Johnson, representing Patient Fire Safety Coalition, requests Disapproval.

Commenter's Reason: Two primary portions of this proposal that are in direct conflict with the goals of fire and life safety are sections 1105.3.2 and 1105.3.4.3.

Section **1105.3.2** states that "unless required elsewhere in *this* code, corridor walls are not required to have a fire-resistance rating." The IFC never actually requires any specific wall to have a given fire rating, therefore, this requirement essentially points to nothing at all. As this proposal, also, is not predicated on sprinkler protection or anything else, the easiest and most common interpretation of this code will be that "no corridor needs a fire rating."

There are no fire-resistance ratings specifically mandated within the IFC, for sprinklered occupancies or non-sprinklered. Only the IBC sets requirements for fire-resistance rated corridors, and in fact, the IBC presupposes that I-2 occupancies are sprinklered so no rated corridor is called out. Rated corridors are only called out in the legacy codes which applied at the time of new construction.

The building codes which applied at the time of construction are what required these fire rated corridors, not this fire code. On what basis can these corridors now be blindly abandoned? It is unknown what provisions were made, or local standards applied at the time of original construction.

Nowhere in this proposal does it point back to IFC 701.2 or 107.1, which state that any required fire resistant components are to be maintained to the codes to which the building was originally built, remodeled, or altered too. Based on my own nearly 10 years of experience as a municipal inspector, I would conclude that it is highly likely that the intent of 1105.3.2 will surely be misinterpreted by local officials to mean that "no corridor needs a fire rating", thus creating an unsafe condition.

Section **1105.3.4.3** allows for completely unprotected slots and pass-through openings in corridor walls and doors. The openings are not required to have any type of closure, neither automatic nor manual, and can be permanently open The code works as a system. Whether a given corridor wall is a fire partition, due to construction under a legacy code, or is a smoke partition, that egress corridor wall is part of a system. A hospital corridor wallis always designed to limit the spread of fire or smoke. To henceforth allow 80 square inch unprotected holes in the corridor wall at every patient room is in disagreement with IFC 703.1.3 that states that all fire walls, barriers, and partitions shall be maintained to prevent the passage of fire, and is in disagreement with 703.1.2 that states that all smoke partitions shall be maintained to prevent the passage of smoke. Allowing these openings will enhance the spread of fire and smoke, naturally seeking the path of least resistance, throughout the facility.

The AdHoc Committee for Healthcare has stated that they are bringing forth these proposals to more closely align with CMS requirements. However, as CMS conducts life safety inspections based on NFPA codes and standards this change is not consistent with their stated desired alignment. NFPA 101:19.3.6.2.3 states, "Corridor walls shall form a barrier to limit the transfer of smoke." Other relevant sections of NFPA 101 restrict the usage of louvers in corridor doors and limit the clearance at the bottom of the doors to a maximum of 1 inch. The proposed unprotected 80 square inch unprotected openings are completely inconsistent with the NFPA 101 measures designed to keep smoke from traveling unimpeded between corridors and patient rooms.

F239-13

Final Action: AS AM AMPC____ D

F241-13
1105.5 (New)

Proposed Change as Submitted

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov)

Add new text as follows:

SECTION 1105
CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.5 Smoke compartments. Smoke compartments shall be provided in existing Group I-2 Condition 2, in accordance with Sections 1105.5.1 through 1105.5.4.

1105.5.1 Design. Smoke barriers shall be provided to subdivide each story used for patients sleeping with an occupant load of more than 30 patients into no fewer than two smoke compartments.

1105.5.1.1 Refuge areas. Refuge areas shall be provided within each smoke compartment. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining smoke compartment. Where a smoke compartment is adjoined by two or more smoke compartments, the minimum area of the refuge area shall accommodate the largest occupant load of the adjoining compartments.

The size of the refuge area shall provide the following:

1. Not less than 30 net square feet (2.8 m^2) for each care recipient confined to bed or stretcher.
2. Not less than 15 square feet (1.4 m^2) for each resident in a Group I-2 using mobility assistance devices.
3. Not less than 6 square feet (0.56 m^2) for each occupant not addressed in Items 1 and 2.

Areas of spaces permitted to be included in the calculation of the refuge area of corridors, sleeping areas, treatment rooms, lounge or dining areas and other low-hazard areas.

1105.5.2 Smoke barriers. Smoke barriers shall be constructed in accordance with Section 709 of the *International Building Code*.

Exceptions:

1. Existing smoke barriers with a minimum of 1/2 –hour fire-resistance rating are permitted to remain.
2. Smoke barriers shall be permitted to terminate at an atrium enclosure in accordance with Section 404.6 of the *International Building Code.*

1105.5.3 Opening protectives. Openings in smoke barriers shall be protected in accordance with Section 716 of the *International Building Code*. Opening protectives shall have a with a minimum fire-protection-rating of 1/3 hours.

Exception: Wired glass vision panels in doors shall be permitted to remain.

1105.5.4 Duct and air transfer openings. Penetrations in a smoke barrier by duct and air transfer openings shall comply with Section 717 of the *International Building Code*.

Exception: Where existing duct and air transfer openings in smoke barriers exist without smoke dampers, they shall be permitted to remain. Any changes to existing smoke dampers shall be submitted for review and approved in accordance with IBC Section 717 of the *International Building Code*.

Reason: This change adds minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities – it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. This code change will align the Fire Code with those CMS minimum requirements and will hopefully lead to industry consolidation. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that have been vetted by the industry as well as code officials and that are consistent with current national standards used by the Federal Government providing a more uniform level of safety and eliminating many of the current code conflicts for existing facilities.
We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

This provision is written in regard to the design, construction and application of smoke compartments for Group I-2 hospital facilities. Smoke compartments are a key component of the defend in place strategy, a strategy where victims are protected from fire without relocation, used in healthcare facilities to limit the movement of smoke. These compartments act as safe locations for patients by preventing the spread of smoke. Through compartmentalization, patients may remain safely in their rooms as fire suppression systems and fire responders extinguish the fire. Under severe fire conditions that threaten the immediate compartment area, patients may be evacuated horizontally to the safety of an adjacent compartment on the same floor. Being able to do this is critical since due to the health status of many patients their evacuation from the building might put them in grave danger. The proper design, construction and application of smoke compartments will provide added protection, buy valuable time and save lives of critically ill patients before a total evacuation may become necessary.

These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities. These inspections are required by federal laws for certification and reimbursement. This requirement considers the minimum previously approved construction methods. This is consistent with the federal requirements that these facilities are currently held too. Specific concepts include:

- 1105.5 Smoke compartments – The defend-in-place concept is a basic minimum level of safety for these facilities. Every facility should be equipped at least two smoke compartments for temporary relocation of patients.
- 1105.5.1 Design - This section addresses existing acceptable configuration of smoke barrier walls and smoke barriers for existing hospitals in areas with sleeping rooms.
- 1105.5.1.1 Refuge area – Addresses adequate sizing of refuge areas. IBC 407.5.1 also includes requirements for independent egress and horizontal assemblies.
- 1105.5.2 Smoke barriers – The intent is to bring noncompliant smoke barriers to at least ½ hour fire resistance rating. Previously approved smoke barriers are not intended to be reduced to ½. Chapter 7 of the IFC would require maintenance of approved construction.
- 1105.5.3 Opening protectives - Address doors in smoke barriers in existing Group I-2 occupancies. Reference to 716 is so you that don't loose other requirements.
- 1105.5.4, Guides the inspector of existing facilities on how they would look at opening protectives. Smoke dampers have not always been required in hospitals, and the 2015 IBC would not require them. Therefore, in those hospitals that were originally approved without smoke dampers required, that condition is allowed to remain in place. Any modification of existing smoke dampers would have to go throught he normal process for making an alteration to existing construction.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

Cost Impact: None

1105.5 (NEW)-F-WILLIAMS-ADHOC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

1105.5.2 Smoke barriers. Smoke barriers shall be constructed in accordance with Section 709 of the *International Building Code*.

Exceptions:

1. Existing smoke barriers ~~with a minimum of 1/2 - hour fire-resistance rating~~ are permitted to remain where the existing smoke barrier has a minimum fire resistance rating of ½ hour.
2. Smoke barriers shall be permitted to terminate at an atrium enclosure in accordance with Section 404.6 of the *International Building Code.*

1105.5.3 Opening protective. Openings in smoke barriers shall be protected in accordance with Section 716 of the *International Building Code.* Opening protective shall have ~~a with~~ a minimum fire-protection-rating of 1/3 hours.

Exception: Existing wired glass vision panels in doors shall be permitted to remain.

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee agreed with the proponent that the code change reflects an important and needed coordination effort to correlate the IFC with Federal Center for Medicaid and Medicare Services (CMS) healthcare regulations with which all facilities must now comply and that it will eliminate costly conflicting requirements among different codes applicable to such facilities. The modification clarifies the applicability of the exception.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council (IFC), requests Approval as Submitted.

Further modify the proposal as follows:

SECTION 1105
CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.5 Smoke compartments. Smoke compartments shall be provided in existing Group I-2 Condition 2, in accordance with Sections 1105.5.1 through ~~1105.5.4~~ 1105.5.6.

1105.5.5 Penetrations. Penetrations of smoke barriers shall comply with Section 714 of the International Building Code.

1105.5.6 Joints. Joints made in or between smoke barriers shall comply with Section 715 of the International Building Code.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This modification adds two critical elements that are lacking in the current proposals. As the proponents have indicated, the proposed change is intended to add minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. Their intent is to increase the minimum safety requirements due to the fragile and sensitive populations within these facilities.

Protection of Penetrations and Joints through smoke barriers is critical to their performance in resisting the passage of both smoke and fire. The proposal initially acknowledges this need by including requirements for Opening Protectives, Ducts, and Air Transfer Openings, but has omitted two of the other components that are critical to the ability of walls and floors to limit the transfer of fire and smoke. Joints and Penetrations through these existing assemblies would already have been required to comply with these provisions by prior Legacy Codes, so their omission now will actually reduce the existing minimum level of performance for these fragile and sensitive populations.

The IBC and IFC currently require protection of Penetrations and Joints in Fire Partitions, Smoke Partitions, Smoke Barriers, Fire Barriers and Fire Walls. Since the proponents stated intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities, it is not possible to achieve that acceptable minimum level of safety for I-2 occupancies without including these protection provisions.

Public Comment 2:

William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (FCIA), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

<u>**1105.5.4 Penetrations.** Penetrations of *smoke barriers* shall comply with the *International Building Code*.</u>

<u>**Exception:** Approved existing materials and methods of construction.</u>

<u>**1105.5.5 Joints.** Joints made in or between *smoke barriers* shall comply with *International Building Code*.</u>

<u>**Exception:** Approved existing materials and methods of construction.</u>

(Renumber subsequent sections)

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: The proposed new section for existing smoke barriers does not address penetrations and joints. Especially as compared to some of the other new sections, the lack of requirements could imply that there are no requirements. Note that F239 (corridors) contains sections on penetrations and joints.

The proposed language indicates that penetrations and joints are to be protected as required by the IBC. However, recognizing that existing penetrations and joints may be protected using materials or construction methods that were acceptable at the time of construction but not permitted by the current edition of the IBC, the proposed language exempts existing approved materials and methods of construction. However, it should be noted that new penetration in an existing smoke barrier would need to be protected as required by the IBC

Public Comment 3:

Vickie Lovell, Intercode, Inc., representing Air Movement and Control Association International, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

1105.5.4 Duct and air transfer openings. Penetrations in a smoke barrier by duct and air transfer openings shall comply with Section 717 of the International Building Code.

~~**Exception:** Where existing duct and air transfer openings in smoke barriers exist without smoke dampers, they shall be permitted to remain. Any changes to existing smoke dampers shall be submitted for review and approved in accordance with IBC Section 717 of the International Building Code.~~

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: The Air Movement and Control Association, International disagrees with the need for the exception for 1105.5.4 in this proposal. There is no reason to have this exception to exist as written if the Fire Code references the 2015 International Building Code.

The proponent is only partially accurate in the reason statement:

"Smoke dampers have not always been **required** ***in hospitals, and the 2015 IBC would not require them."***

Smoke dampers have been required in smoke barriers since the 2000 IBC. The new 2015 IBC exception for smoke dampers in smoke barriers in I-2s is conditional upon the construction of the duct system and the building being fully sprinklered. Therefore, this exception as written is potentially more generous than what the current 2015 IBC permits if the terms of the 2015 IBC exception are not taken into account. If they are taken into account, then there is no need for the exception.

The Fire Code does not trigger the installation of new smoke dampers in duct and air transfers in previously approved existing buildings. Therefore, there is no need for the exception.

The proposed exception states that "any modification of existing smoke dampers would have to go through the normal process for making an alteration to existing construction." What would that be? Dampers are typically not modified in the field, other than for needed repairs. This exception creates confusion and speculation about what damper "modification" might be.

Smoke dampers could also be required to be installed in an existing duct system when a smoke control system is newly installed in an atrium. However, the IBC states that they cannot be eliminated (and be required) if they are part of a smoke control system. So, the proposed exception could create a barrier to making an alteration in existing hospitals, when required. Simply pointing to the current IBC in 717 covers all these conditions, and once again, the exception is not necessary.

Public Comment 4:

Brice Miller representing International Firestop Council (IFC), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

SECTION 1105
CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.5.2 Smoke barriers. Smoke barriers shall be constructed in accordance with Section 709 of the International Building Code.

Exceptions:

1. <u>Where approved by the building official, e</u>xisting smoke barriers are permitted to remain where the existing smoke barrier <u>is</u> ~~has~~ <u>determined to have</u> a minimum fire resistance rating of ½ hour <u>based on plans, investigation, evaluation reports and other data submitted.</u>
2. Smoke barriers shall be permitted to terminate at an atrium enclosure in accordance with Section 404.6 of the International Building Code.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This public comment is a clarification of the proposed language. As the proponents have indicated, the proposed change is intended to add minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. Their intent is to increase the minimum safety requirements due to the fragile and sensitive populations within these facilities.

This revised language attempts to address the issue of how to ensure a proper review by the building code official is performed to ensure there are no impediments to granting an approval that may result in the reduction of existing levels of protection. It identifies that process by stipulating that plans, investigation and evaluation reports, and other data can be submitted seeking approval of the code official for the assignment of the new fire-resistance ratings which might be a reduction in the current level. Any special construction features conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings must also be identified in the evaluation reports submitted. This is to ensure special conditions are identified that may prevent a reduction in fire-resistance ratings and fire safety of the building.

F241-13
Final Action: AS AM AMPC____ D

F245-13
2204.1

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

2204.1 Standards. ~~The *fire code official* is authorized to enforce applicable provisions of the c~~ Codes and standards listed in Table 2204.1 ~~to prevent and control dust explosions~~ shall apply to operations involving combustible dust.

Reason: This change is based on a recommendation from the Chemical Safety Board (CSB) following their investigation of the dust explosions at the Hoeganaes Corporation in Gallatin, Tennessee. The CSB determined that the state of Tennessee considered the language in this code section to be a discretionary (not mandatory) code requirements; the state of Tennessee did not adopt this section of the IFC because it considered the requirement as not mandatory. This code change is intended to clarify the intent of this code section as to when the applicable dust standards must be enforced top prevent dust accumulations that could lead to dust explosions.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

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

2204.1-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

2204.1 Standards. The applicable provisions of the codes and standards listed in Table 2204.1 shall apply to operations involving combustible dust.

Committee Reason: The committee agreed with the proponent's reason statement that the code change makes the provisions of the combustible dust standards mandatory rather than discretionary. The modification clarifies the applicability of the standard contents.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Elley Klausbruckner, representing Klausbruckner & Associates Inc., requests Disapproval.

Commenter's Reason: We do not believe that the proponents, in their evaluation of these standards, fully realize the consequences of the changes to the requirements and its effect on small operations such as small woodshops in schools, etc. Additionally, the standards proposed provide conflicting requirements, and would subject the code users and AHJs to liability. For example, the requirements for maximum dust thickness on surfaces are conflicting in different NFPA Standards:

NFPA-654 1/32” @ 75 lb/ft3, Adjusted for Lower Bulk Density
NFPA-664 1/8”, Assumes 20 lb/ft3 Bulk Density
NFPA-484 Does Not Allow Accumulation, Infers Daily Cleaning Schedule
NFPA-61 Remove Concurrently with Operations, Refers to 654; OSHA 1910.272 for grain handling facilities used 1/8”

While, for example, NFPA 61 would not conflict with NFPA 484 because one addresses agricultural and food products while the other address combustible metals, the requirements of NFPA 654 [addresses all combustible dust particles] does conflict with the remainder of these standards.

As another example, NFPA 664 for woodworking facilities apply when >5,000 sq ft or where dust producing equipment require an aggregate dust collection flow rate of >1500 ft^3/min [NFPA 664, 2012 Edition, Section 1.1.2]. Additionally NFPA 664, when applicable, references NFPA 69 on explosion prevention [e.g. Section 8.2.2.5.3 on construction of dust collectors with deflagration hazard]. The proposed revision to the language by the proponent and as approved by the committee, would require explosion prevention by the AHJ for woodworking shops less than 5000 sq ft, since NFPA 69 is still “applicable” [since this standard is applicable to explosion prevention of combustible dust] even if NFPA 664, the standard which is more specific to woodworking does not require it. Additionally a small woodworking shop [<5000 sq ft] would require compliance with NFPA 654 since NFPA 654, section 1.1.1 states that the standard applies to “*all phases of the manufacturing, processing, blending, conveying, repackaging, and <u>handling</u> of combustible particulate solids or hybrid mixtures, regardless of concentration or particle size, where the materials present a fire or explosion hazard.”* As part of NFPA 654, the business owner is required to meet the prescriptive requirements and/or expensive evaluations to minimize the construction cost [if prescriptive option is chosen] for their small woodshop as listed in the attached table. Please note that this would apply to even small woodshop in local school theaters, etc.

While IFC Chapter 22 may need additional revisions, the language proposed will create conflicting code requirements and it will apply a very stringent and broad brush across many uses and businesses where in many cases a simple local dust collection is all that may needed. We would recommend a future code change to Chapter 22 with more specific requirements applicable to specific hazards.

F245-13
Final Action: AS AM AMPC____ D

F248-13
2307.2 (IFGC [F] 412.2), 2307.2.2 (IFGC [F] 412.4); 2307.2.3 (IFGC [F] 412.5) (New)

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.2 (IFGC [F] 412.2) Approvals. Storage vessels and equipment used for the storage or dispensing of LP-gas shall be *approved* or *listed* in accordance with Sections 2307.2.1 ~~and 2307.2.2~~ through 2307.2.3.

2307.2.1 (IFGC [F] 412.3) Approved equipment. Containers, pressure relief devices (including pressure relief valves), pressure regulators, and piping for LP-gas shall be *approved*.

2307.2.2 (IFGC [F] 412.4) Listed equipment. Hoses, hose connections, vehicle fuel connections, ~~dispensers~~, LP-gas pumps and electrical equipment used for LP-gas shall be *listed*.

2307.2.3 (IFGC [F] 412.5) LP-Gas dispensers. Where installed at facilities that are not intended for public refueling of vehicles, LP-gas dispensing equipment shall be approved. Where installed at facilities that are intended for public refueling of vehicles, LP-gas dispensers shall be listed.

Reason: The vast majority of LP-gas motor fuel dispensers in use today are not listed units. However, these dispensers are not available to the general public to refuel its vehicles. They are installed at private companies for use with fleet vehicles or for filling portable motor fuel cylinders used with forklift trucks, lawn mowers and other motorized applications. Requiring these dispensers to be "approved" rather than "listed" allows for their continued installation and use. The code official is able to approve the installation whether the "packaged" dispenser system itself is listed or not, using the requirements in Section 2307 and Chapter 61 of the IFC, as well as referenced standard NFPA 58 "LP-Gas Code." These references provide all the necessary requirements for approving the installation of a dispenser. The individuals that use these dispensers are properly trained on the hazards of LP-gas and the safe use of the filling equipment.
Dispensers may also be located at public refueling stations (gasoline stations) along with other fuels. We are proposing in paragraph 2307.2.3 that for these applications, propane dispenser systems must be listed units to make them equivalent to the units that are being installed for self-service gasoline and diesel applications. These units would be factory-assembled with a storage container, pump, meter and dispenser hose and hose end valve on a common base or skid and shipped to the site for installation as a packaged unit. Or, they may be assembled at a factory and fully contained within a cabinet, shipped to the site for installation on an island and served by a remote LP-gas tank, similar to gasoline dispensers,

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

2307.2.2-F-SWIECICKI

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the hazards of LPG dispensing warrant requiring that all dispensers be listed, not just the ones for public use.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Approval as Submitted.

Commenter's Reason: The vast majority of LP-gas motor fuel dispensers in use today are not listed units. However, they are fabricated from using listed equipment as required in current Section 2307.2.2. These dispensers are not available to the general public because they are installed at private companies for use with fleet vehicles. The code official is able to approve the installation whether the dispenser is listed as a unit or built from listed equipment, using the requirements in Section 2307 and Chapter 61 of the IFC. These references provide all the necessary requirements for approving the installation of a dispenser. The individuals that use any LP-Gas dispenser are required to be properly trained on the hazards of LP-gas and the safe use of the filling equipment.

Dispensers may also be located at public refueling stations (gasoline stations) along with other fuels. We are proposing in paragraph 2307.2.3 that for these applications, propane dispenser systems must be listed units. We believe this was the original intent of the code and would maintain consistency with the units that are being installed for self-service gasoline and diesel applications, as well as other alternative fuels.

F248-13
Final Action: AS AM AMPC____ D

F250-13
2307.4 (IFGC [F] 412.6)

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.4 (IFGC [F] 412.6) Location of dispensing operations and equipment. ~~In addition to the requirements of Section 2306.7, the point of transfer for LP-gas dispensing operations shall be 25 feet (7620 mm) or more from buildings having combustible exterior wall surfaces, buildings having noncombustible exterior wall surfaces that are not part of a 1-hour fire-resistance-rated assembly, or buildings having combustible overhangs, *lot lines* of property which could be built on, public streets, or sidewalks and railroads; and at least 10 feet (3048 mm) from driveways and buildings having noncombustible exterior wall surfaces that are part of a fire-resistance-rated assembly having a rating of 1 hour or more.~~ <u>The point of transfer for LP-Gas dispensing operations shall be separated from buildings and other exposures in accordance with the following:</u>

1. <u>Not less than 25 feet from buildings in which the exterior wall is not part of a fire-resistance-rated assembly having a rating of 1 hour or greater.</u>
2. <u>Not less than 25 feet from combustible overhangs on buildings, measured from a vertical line dropped from the face of the overhang at a point nearest the point of transfer.</u>
3. <u>Not less than 25 feet from the lot line of property that can be built upon.</u>
4. <u>Not less than 25 feet from mainline railroad track centers.</u>
5. <u>Not less than 10 feet from public streets, highways, thoroughfares, sidewalks and driveways.</u>
6. <u>Not less than 10 feet from buildings in which the exterior wall is part of a fire resistance rated assembly having a rating of 1 hour or greater.</u>

Exception: The point of transfer for LP-gas dispensing operations need not be separated from canopies that are constructed in accordance with the *International Building Code* and that provide weather protection for the dispensing equipment. LP-gas containers shall be located in accordance with Chapter 61. LP-gas storage and dispensing equipment shall be located outdoors ~~and in accordance with Section 2306.7~~.

Reason: The changes to section 2307.4 are necessary in order to make the paragraph easier to understand and to eliminate reference to Section 2306.7, which addresses dispenser installations for gasoline and diesel fuels, neither of which are similar to LP-gas. Therefore, Section 2306.7 contains many requirements that do not make sense when applied to LP-gas installations. We are therefore proposing a new section (2307.5) that will contain just those requirements from 2306.7 that are applicable to LP-gas dispensers.

Also included in the new formatting are proposed changes that will bring the IFC into agreement with NFPA 58 "LP-Gas Code" with respect to separation distances.

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

2307.4-F-SWIECICKI

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent's reason statement that the code change provides a needed clarification and improved format of the requirements applicable to LPG equipment apart from the flammable liquid requirements and improves correlation with NFPA 58. The committee indicated that it felt that a simple reference to NFPA 58 would be sufficient.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

2307.4 (IFGC [F] 412.6) Location of dispensing operations and equipment. The point of transfer for LP-Gas dispensing operations shall be separated from buildings and other exposures in accordance with the following:

1. Not less than 25 feet from buildings in which the exterior wall is not part of a fire-resistance-rated assembly having a rating of 1 hour or greater.
2. Not less than 25 feet from combustible overhangs on buildings, measured from a vertical line dropped from the face of the overhang at a point nearest the point of transfer.
3. Not less than 25 feet from the lot line of property that can be built upon.
4. Not less than 25 feet from the centerline of the nearest mainline railroad track ~~centers~~.
5. Not less than 10 feet from public streets, highways, thoroughfares, sidewalks and driveways.
6. Not less than 10 feet from buildings in which the exterior wall is part of a fire resistance rated assembly having a rating of 1 hour or greater.

   Exception: The point of transfer for LP-gas dispensing operations need not be separated from canopies that are constructed in accordance with the *International Building Code* and that provide weather protection for the dispensing equipment.

LP-gas containers shall be located in accordance with Chapter 61. LP-gas storage and dispensing equipment shall be located outdoors.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This proposal will clarify the intent of where the measurement is taken to mainline railroad track centers and is consistent with Table 6.5.3 of NFPA 58.

F250-13

Final Action: AS AM AMPC____ D

F252 – 13
2307.6 (IFGC [F] 412.8), 2307.7

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.6 (IFGC [F] 412.8) ~~Private~~ Public fueling of motor vehicles. ~~Self-service LP-gas dispensing systems, including key, code and card lock dispensing systems, shall not be open to the public and shall be limited to the filling of permanently mounted fuel containers on LP-gas powered vehicles~~ Self-service LP-Gas dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of containers providing fuel to the LP-Gas powered vehicle.

~~In addition to the requirements of Sections 2305 and 2306.7,~~ The requirements for self-service LP-gas dispensing systems shall be in accordance with the following:

1. The arrangement and operation of the transfer of product into a vehicle shall be in accordance with this section and Chapter 61.
2. The system shall be provided with an emergency shutoff switch located within 100 feet (30 480 mm) of, but not less than 20 feet (6096 mm) from, dispensers.
~~2~~3. The *owner* of the LP-gas motor fuel-dispensing facility or the owner's designee shall provide for the safe operation of the system and the training of users.
4. The dispenser and hose-end valve shall release not more than 4cc of liquid to the atmosphere upon breaking the connection with the fill valve on the vehicle.
5. Fire extinguishers shall be provided in accordance with Section 2305.4.
6. Warning signs shall be provided in accordance with Section 2305.6.
7. The area around the dispenser shall be maintained in accordance with Section 2305.7.

2307.7 Overfilling. LP-gas containers shall not be filled with LP-gas in excess of the volume determined using the fixed maximum liquid level gauge installed on the container, the volume determined by the overfilling prevention device installed on the container, ~~outage installed by the manufacturer~~ or the weight determined by the required percentage of the water capacity marked on the container ~~stamped on the tank~~.

Reason: Propane is recognized as an alternative motor vehicle fuel by the U.S. government. In order for the public to take full advantage of the benefits of its reduced emissions and cleaner burning properties, the code must be changed to recognize the technologies that are available to ensure the safe refueling of LP-gas vehicles, which in turn will result in increasing acceptance of this smart alternative fuel.

The current provisions in Section 2307.6, which prohibit public access to self-service equipment, are too restrictive and without any basis in safety or technical experience. There are no reasons to prohibit anyone who has been properly trained to perform the refueling operation from refueling their LP-gas vehicle at a public refueling facility. Propane (LP-Gas) refueling technology provides the following features:

- Liquid product will not flow out of the hose end valve unless the valve is completely connected and securely in place on the fill valve of the vehicle.
- Propane hose end valves will mate with the fill valve on the vehicle and upon disconnect will release no more than 4 cubic centimeters of liquid to the atmosphere.
- The propane refueling system is a closed system, which means that there is no opportunity for air, water or any other contaminant to enter the system.
- Individuals must be trained in order to use the filling equipment. This requirement is ensured by the use of key, code and card lock dispensing systems. Only trained individuals are issued the necessary security devices to enable the refueling of the vehicle.

Regarding the proposed changes to 2307.6, the deletion of references to Sections 2305 and 2306.7 are necessary because those sections are mostly intended to be used for the installation of Class I or Class II liquids. Since propane is a liquefied petroleum gas, many of the provisions in those sections are not applicable to propane installations. The applicable requirements from those two sections have been relocated to 2307.6. In addition, proposed requirement #4 is based on NFPA 30A *Motor Fuel Dispensing Facilities and Repair Garages.*

The proposed change to 2307.7 is necessary in order to incorporate the correct terminology and also recognize that sometimes, the fixed maximum liquid level gauge is installed by a trained service technician. This is especially the case if repairs are being made to the container or the valve. In addition, some vehicles rely upon an overfilling prevention device and the fixed maximum liquid level gauge is not used. Therefore, it is necessary to list that device as an approved means for filling the container.

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

2307.6-F-SWIECICKI

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The committee agreed with the proponent's reason statement and that the code change is consistent with the committee action on code changes F250-13 and F251-13. The committee expressed concern that there needs to be similar specific requirements for private fueling.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

2307.6 (IFGC [F] 412.8) Public fueling of motor vehicles. Self-service LP-Gas dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of <u>permanently mounted</u> containers providing fuel to the LP-Gas powered vehicle.

The requirements for self-service LP-gas dispensing systems shall be in accordance with the following:

1. The arrangement and operation of the transfer of product into a vehicle shall be in accordance with this section and Chapter 61.
2. The system shall be provided with an emergency shutoff switch located within 100 feet (30 480 mm) of, but not less than 20 feet (6096 mm) from, dispensers.
3. The *owner* of the LP-gas motor fuel-dispensing facility or the owner's designee shall provide for the safe operation of the system and the training of users.
4. The dispenser and hose-end valve shall release not more than 4cc of liquid to the atmosphere upon breaking the connection with the fill valve on the vehicle.
5. Fire extinguishers shall be provided in accordance with Section 2305.4.
6. Warning signs shall be provided in accordance with Section 2305.6.
7. The area around the dispenser shall be maintained in accordance with Section 2305.7.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: Concerns were expressed at the Code Change Hearings in Dallas that containers other than those used to provide fuel to vehicles could be filled using the LP-Gas dispenser. Even though the concerns were unfounded (the filling connection for motor vehicles is unique and not able to connect to cylinders and other containers), the proposed change to 2307.6 will provide further clarification that only containers permanently mounted on the vehicle for providing fuel to that vehicle can be filled by this dispenser at this location.

F252-13

Final Action: AS AM AMPC____ D

F258 – 13
2311.7

Proposed Change as Submitted

Proponent: Spencer Quong, Quong & Associates, Inc. representing Toyota Technical Center (squong@squong.com)

Revise as follows:

2311.7 Repair garages for vehicles fueled by lighter-than air fuels. Repair garages for the conversion and repair of vehicles which use CNG, liquefied natural gas (LNG), hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections 2311.7 through 2311.7.2.3 in addition to the other requirements of Section 2311.

Exception<u>s</u>:

1. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance requiring no open flame or welding.
2. <u>Repair garages where all of the following conditions exist:</u>
   - <u>2.1 Work is not performed on the hydrogen storage tank and is limited to exchange of parts and maintenance requiring no open flame or welding.</u>
   - <u>2.2 Where work is performed on the hydrogen fuel system, the hydrogen fuel storage container shall be securely sealed such that it is a closed system during maintenance using manufacturer approved procedures.</u>
   - <u>2.3 The entire fuel system shall be defueled in accordance with Section 2311.8 to a quantity that is less than 200 cubic feet (5.6 m^3).</u>

Reason: This proposal is requesting to modify exception to Section 2311.7 to allow work on the fuel system, except for the hydrogen storage tank without having to install additional ventilation and gas detection systems in the repair garage. If work is performed on the fuel system, the vehicle's shutoff valve must be securely closed on the fuel storage container so that it is a closed system and no gas can escape during maintenance operations. In addition, the proposal also requires that entire vehicle fuel system, including the storage container, be defueled to less than 200 cubic feet (NTP).

Although each hydrogen passenger vehicle is different, typically their storage containers hold between 5000-50000 cubic feet (NTP) of hydrogen at high pressure (5000-10000 psi). However, the hydrogen leaving the storage container is regulated to a lower pressure, typically less than 250 psi and less than 10 cubic feet (NTP) of hydrogen.

Any release of hazardous material can pose a problem. However, this proposal addresses the issues in two ways. First, it requires that the shutoff valve on the fuel storage container to be securely closed. Hydrogen vehicles are required to have a manual valve that can be shut off for maintenance[1]. In most vehicles, the shutoff valve fails shut, so the standard operating procedure to ensure that the valve is closed is to disconnect the 12V battery. For manual valves, it can be tagged and locked in the off position. Since almost all of the hydrogen is in the fuel storage container, this requirement will ensure only a minimal amount of hydrogen is left in the remainder of the fuel system.

Second, in the event that the fuel storage container is opened during repairs and all of the hydrogen is allowed to escape, this proposal requires that the entire fuel system be defueled to less than 200 cubic feet (NTP). <u>**This is less than 20% of the Maximum Allowable Quantity (MAQ) per control area**</u> listed in Table 5003.1.1(1) through 5003.1.1(4). In addition, Section 5308.1.1 allows for the indoor storage and use of cylinders of non-liquefied compressed, flammable gases not exceeding a capacity of 250 cubic feet NTP used for maintenance purposes without any ventilation and gas detection systems. Finally, according to Table 105.6.8, an operational permit is not required for less than 200 cubic feet (NTP) of flammable, compressed gases.

With more and more hydrogen vehicles on the road, there is a need to be able to work on the low pressure side of the fuel system at any repair garage without adding additional ventilation and gas detection systems. This proposal allows for this work as long as two requirements are met: the fuel storage container is closed and amount of hydrogen is less than <u>**the existing IFC limitations for hazardous materials, and flammable and compressed gases**</u>. Already, repair garages have industrial cylinders of acetylene and other flammable gases without additional ventilation and detection equipment. Even if the repair garages meet the requirements in this exception, they will still need to be in accordance with Sections 5001 and 5003.

[1] Section 4.1.1.3 of SAEJ2579 "Standard for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles"

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

2311.7-F-QUONG

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee's disapproval was based on its agreement with testimony that indicated that NFPA 2 Hydrogen Code is being revised on this topic but that the exact wording is not yet known and could be in conflict with these provisions if they were to be approved. The committee suggested that Exception 2, Item 2.1 should be clarified to indicate if hot work would be allowed elsewhere in the repair garage. It was also suggested that the exceptions be rewritten as compliance alternatives rather than exceptions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Spencer Quong, Quong & Associates, Inc., representing Toyota Technical Center, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

2311.7 Repair garages for vehicles fueled by lighter-than air fuels. Repair garages for the conversion and repair of vehicles which use CNG, liquefied natural gas (LNG), hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections 2311.7 through 2311.7.2.3 in addition to the other requirements of Section 2311.

Exceptions:

1. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance requiring no open flame or welding on the CNG, liquefied natural gas (LNG), hydrogen or other lighter-than-air motor fueled vehicle..
2. Repair garages for hydrogen fueled vehicles where work is not performed on the hydrogen storage tank and is limited to the exchange of parts and maintenance requiring no open flame or welding on the hydrogen fueled vehicle. During the work the entire hydrogen fuel system shall contain a quantity that is less than 200 cubic feet (5.6 m3) of hydrogen. ~~Repair garages where all of the following conditions exist:~~
   ~~2.1 Work is not performed on the hydrogen storage tank and is limited to exchange of parts and maintenance requiring no open flame or welding.~~
   ~~2.2 Where work is performed on the hydrogen fuel system, the hydrogen fuel storage container shall be securely sealed such that it is a closed system during maintenance using manufacturer approved procedures.~~
   ~~2.3 The entire fuel system shall be defueled in accordance with Section 2311.8 to a quantity that is less than 200 cubic feet (5.6 m^3).~~

Commenter's Reason: The modification to the exception has been condense the language. The 2.2 portion of the original submittal is already covered by Section 2311.5 of the IFC. As requested by the committee, the existing language has been clarified by identifying that no open flame or welding shall be performed on the vehicle containing the gaseous motor fuel.

The added exception for the hydrogen fueled vehicle repairs will be consistent with language currently under development by the NFPA 2 committee.

F258-13

Final Action: AS AM AMPC____ D

F260-13
2404.6.1.2.1

Proposed Change as Submitted

Proponent: Geoff Raifsnider, P.E., Global Finishing Solutions representing self (graifsnider@globalfinishing.com)

Revise as follows:

2404.6.1.2.1 Interlocks. The spraying apparatus, drying apparatus and ventilating system for the spray booth or spray room shall be equipped with interlocks arranged to:

1. Prevent operation of the spraying apparatus while drying operations are in progress.
2. Where the drying apparatus is located in the spray booth or spray room, prevent operation of the drying apparatus until a timed purge of spray vapors from the spray booth or spray room is complete. This purge time shall be based upon completing not less than 4 air changes of spray booth or spray room volume. ~~Purge spray vapors from the spray booth or spray room for a period of not less than 3 minutes before the drying apparatus is rendered operable.~~
3. Have the ventilating system maintain a safe atmosphere within the spray booth or spray room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system.
4. Shut off the drying apparatus automatically if the air temperature within the booth exceeds 200°F (93°C).

Reason: The current language does not state how the value is calculated. The proposed language clarifies how to calculate the purge time and bases it upon the amount of fresh air introduced in the same manner that is used for purging an oven. This is appropriate since the drying operation has turned the spray booth into an oven.

As mentioned this proposal is based upon the language in NFPA 86 Standard for Ovens and Furnaces 2011 Edition. The idea is to replace the air in the booth at least four times (4 ft^3 of air/ft^3 of booth) to ensure that the concentration at the end of the purge interval is less than 25% of the lower flammable limit.

The IFC (2406.1.2) currently requires compliance with Chapter 30 when utilizing drying in a spray booth. Section 3007.2 states that a nameplate shall be provided that, among other information, indicates the required purge time (2107.2(3)). The code official can initially verify that the purge timer is set to this value. If there is cause to doubt this information the calculations mentioned can be performed to verify the minimum purge time.

The purge interval is a function of the spray booth size (cubic feet) and the ventilation rate (cubic feet per minute). Both of these values are documented and measurable for a given spray booth.

To verify that the purge time is sufficient to meet the code, multiply the volume of the booth by four (4) and divide by the exhaust flow rate. An example would be a spray booth that measures 10 ft wide x 10 ft high x 14 ft long (volume = 1,400 ft3). If this booth was designed for 100 feet per minute downdraft the exhaust flow rate would be 14,000 ft3/min (10 ft x 14 ft x 100 fpm). To calculate the minimum purge time you would multiply 1400 ft3 by four (4) and divide by 14,000 ft3/min. The resulting minimum purge time would be 0.4 minutes (1400x4/14000=0.4).

For booths that elevate the air temperature for curing via the same supply air unit used for tempering the air for painting, there is no need for a post paint purge of spray vapors. One type of spray/cure booth elevates the incoming (outside) air temperature and does not recirculate. This type poses no risk of bringing spray vapors back around and through the heating source. The other type of spray/cure booth switches to a recirculation mode during cure. In this mode, the spray/cure booth functions just like an oven and since other sections of the code require the concentration in the exhaust air stream to be less than 25% of the LFL the concentration that could be seen at the burner is not flammable. However if the drying apparatus is in the spray area and could be directly exposed to spray vapors, it makes sense to purge that space prior to energizing the drying apparatus.

There are many paint finishing operations, typically in the automotive refinish industry, that are negatively affected by the delay between painting and curing at an elevated temperature. By allowing the proposed changes, the spray booth designer can take into account the importance the purge interval may have on the process. By designing for the correct air flow, both a safe environment for energizing the drying apparatus and a minimum time between spray and cure can be achieved.

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

2404.6.1.2.1-F-RAIFSNIDER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the ventilation duration needs clarification by being more specific and should include a minimum run-on time prior to shutting down operations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Geoffrey Raifsnider, Global Finishing Solutions, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

2404.6.1.2.1 Interlocks. The spraying apparatus, drying apparatus and ventilating system for the spray booth or spray room shall be equipped with interlocks arranged to:

1. Prevent operation of the spraying apparatus while drying operations are in progress.
2. Where the drying apparatus is located in the spray booth or spray room, prevent operation of the drying apparatus until a timed purge of spray vapors from the spray booth or spray room is complete. This purge time shall be based upon completing at least 4 air changes of spray booth or spray room volume <u>or for a period of not less than 3 minutes, whichever is greater</u>.
3. Have the ventilating system maintain a safe atmosphere within the spray booth or spray room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system.
4. Shut off the drying apparatus automatically if the air temperature within the booth exceeds 200°F (93°C).

Commenter's Reason: The current language does not state how the value is calculated. The proposed language clarifies how to calculate the purge time and bases it upon the amount of fresh air introduced in the same manner that is used for purging an oven. This is appropriate since the drying operation has turned the spray booth into an oven. **The 3 minute minimum from the original language has been added back into the proposal.**

As mentioned this proposal is based upon the language in <u>NFPA 86 Standard for Ovens and Furnaces 2011 Edition</u>. The idea is to replace the air in the booth at least four times (4 ft^3 of air/ft^3 of booth) to ensure that the concentration at the end of the purge interval is less than 25% of the lower flammable limit.

The IFC (2406.1.2) currently requires compliance with Chapter 30 when utilizing drying in a spray booth. Section 3007.2 states that a nameplate shall be provided that, among other information, indicates the required purge time (2107.2(3)). The code official can initially verify that the purge timer is set to this value. If there is cause to doubt this information the calculations mentioned can be performed to verify the minimum purge time.

The purge interval is a function of the spray booth size (cubic feet) and the ventilation rate (cubic feet per minute). Both of these values are documented and measurable for a given spray booth.

To verify that the purge time is sufficient to meet the code, multiply the volume of the booth by four (4) and divide by the exhaust flow rate. An example would be a spray booth that measures 10 ft wide x 10 ft high x 14 ft long (volume = 1,400 ft3). If this booth was designed for 100 feet per minute downdraft the exhaust flow rate would be 14,000 ft3/min (10 ft x 14 ft x 100 fpm). To calculate the minimum purge time you would multiply 1400 ft3 by four (4) and divide by 14,000 ft3/min. The resulting minimum purge time would be 0.4 minutes (1400x4/14000=0.4).

For booths that elevate the air temperature for curing via the same supply air unit used for tempering the air for painting, there is no need for a post paint purge of spray vapors. One type of spray/cure booth elevates the incoming (outside) air temperature and does not recirculate. This type poses no risk of bringing spray vapors back around and through the heating source. The other type of spray/cure booth switches to a recirculation mode during cure. In this mode, the spray/cure booth functions just like an oven and since other sections of the code require the concentration in the exhaust air stream to be less than 25% of the LFL the concentration that could be seen at the burner is not flammable. However if the drying apparatus is in the spray area and could be directly exposed to spray vapors, it makes sense to purge that space prior to energizing the drying apparatus.

There are many paint finishing operations, typically in the automotive refinish industry, that are negatively affected by the delay between painting and curing at an elevated temperature. By allowing the proposed changes, the spray booth designer can take into account the importance the purge interval may have on the process. By designing for the correct air flow, both a safe environment for energizing the drying apparatus and a minimum time between spray and cure can be achieved.

F260-13
Final Action: AS AM AMPC____ D

F261-13
2404.7.3 (IMC [F] 502.7.3.3)

Proposed Change as Submitted

Proponent: Geoff Raifsnider, P.E., Global Finishing Solutions representing self (graifsnider@globalfinishing.com)

Revise as follows:

2404.7.3 (IMC [F] 502.7.3.3) Air velocity. ~~Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross section in the direction of airflow during spraying operations, shall not be less than 100 feet per minute (0.51 m/s).~~ Each spray area shall be provided with mechanical ventilation in accordance with Sections 2404.7.3.1 through 2404.7.3.3 (IMC 502.7.3.3.1 through 502.7.3.3.3).

2404.7.3.1 (IMC [F] 502.7.3.3.1) Open face or open front spray booth. For spray application operations conducted in an open face or open front spray booth, the ventilation system shall be designed, installed and maintained such that the average air velocity into the spray booth through all openings shall be not less than 100 feet per minute (0.51 m/s).

> **Exception:** For fixed or automated electrostatic spray application equipment the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).

2404.7.3.2 (IMC [F] 502.7.3.3.2) Enclosed spray booth or spray room. For spray application operations conducted in an enclosed spray booth or spray room, the ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust air flow below 25 percent of the contaminant's lower flammable limit (LFL).

2404.7.3.3 (IMC [F] 502.7.3.3.3) Enclosed spray booth or spray room with openings for product conveyance. In addition to the requirements of 2404.7.3.2, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through openings shall be not less than 100 feet per minute (0.51 m/s).

> **Exception:** Where methods are used to reduce cross drafts that can draw vapors and overspray through openings from the spray booth or spray room, the average air velocity into the spray booth or spray room shall be capable of capturing and confining vapors and overspray to the spray booth or spray room.

Reason: For spray application using flammable and combustible materials, the industry standards are OSHA 1910.107 and 1910.94, Chapter 24 of the International Fire Code (IFC), and NFPA 33.

With regards to ventilating spray booths and spray rooms, NFPA 33 and the IFC have similar language stating that the concentration of flammable materials in the exhaust system must be kept below 25 percent of the lower flammable limit (LFL).[1, 2] From this requirement alone the minimum ventilation rate of a spray booth or spray room could be calculated. And by dividing this ventilation rate by the cross sectional area of the booth in the direction of air flow a minimum average velocity can be calculated. OSHA requirements for average air velocity were based upon the 1969 edition of NFPA 33 and were intended to provide a measureable that could be used to check the effectiveness of maintaining the booth exhaust below 25% of the LFL.[5] OSHA has recognized that the requirements for average air velocity were not intended for totally enclosed booths.[6]

Current language in the IFC specifies 100 feet per minute minimum air velocity and offers explanation in their commentary that the objective is containment within a designated spraying space and limiting the overspray.[3, 4] It goes on to explain that 100 FPM is the minimum capture velocity for particulate spray material. In an open face booth, it may be necessary to have a face velocity of 100 FPM or higher to provide the capture needed; but in an enclosed booth the enclosure provides the containment.

The following ventilation design basis for paint spray booths is common in the industry and has been effective in providing clean, safe and reliable painting environments which are in compliance with the intent of the International Fire Code, OSHA, and NFPA 33.

1. The total exhaust ventilation rate shall be based upon the minimum amount of air required to maintain the concentration of flammable vapors in the exhaust below 25%
2. Where appropriate the exhaust rate shall be increased by the amount of air needed to:
    - maintain a minimum average velocity through all openings which prevent the escape of overspray from the spray booth
    - achieve the desired collection of overspray toward the exhaust filters
    - achieve the desired paint transfer efficiency

There are many types of booths and rooms in which the 100 fpm value would be detrimental to the quality of the product and based upon the amount of paint used is well in excess of the minimum dilution air needed to keep the exhaust below 25% of the LFL. This extra air also increases the operating costs. The air velocities for a specific spray booth or spray room should be specific to the individual design that accomplishes the desired performance (i.e. 25% LFL or containment of overspray at openings). Chapter 13.75 of Industrial Ventilation – A Manual of Recommended Practice 26th Edition Published by ACGIH, lists many recommended air velocity ranges for various painting operations, some above and some below 100 fpm. This publication could be referenced in the standard or commentary.

This proposal does not require additional knowledge or tools for the AHJ. The designer or owner of the spray booth or room can provide calculations showing the minimum ventilation rate based upon the type and amount of paint being sprayed. The ventilation rate can be converted into an average velocity in the spray area. The AHJ can ask for balancing information to confirm the installation meets the code requirements or can independently measure the design velocity in the same manner as currently used by the AHJ to confirm 100 FPM.

The following are the references indicated above:

1. Chapter 7.2, NFPA 33, Standard for Spray Application Using Flammable or Combustible Materials 2007 Edition
"Each spray area shall be provided with mechanical ventilation that is capable of confining and removing vapors and mists to a safe location and is capable of confining and controlling combustible residues, dusts, and deposits. The concentration of the vapors and mists in the exhaust stream of the ventilation system shall not exceed 25 percent of the lower flammable limit."
2. Chapter 510.3, 2012 International Mechanical Code® 2012 Edition
"The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit."
3. Chapter 2404.7.3, 2012 International Fire Code® 2012 Edition
"Air velocity. Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross section in the direction of airflow during spraying operations, shall not be less than 100 feet per minute (0.51 m/s)."
4. Chapter 1504.7.3, 2006 International Fire Code® Commentary

"To facilitate the keeping of flammable vapors within a designated spraying space and limiting the amount of overspray, the code requires that the exhaust system be adequately sized to maintain an average velocity over the open face of the booth or booth cross section of no less than 100 feet per minute (0.51 m/s), which is the minimum velocity to capture particulate spray material. Velocities exceeding 200 lineal feet per minute (1.01 m/s) have been determined to be too great for this purpose. To determine the minimum ventilation/exhaust capacity in cubic feet per minute (cfm), multiply the booth width (feet) by booth height (feet) by 100 (lineal per feet)."

1. OSHA Directive STD 01-05-010 - STD 1-5.10 - Clarification of 29 CFR 1910.107(b)(5)(i) Average Air Velocity of Spray Booths, June 1, 1973

    "The average air velocity requirements over the open face of the booth stated in this paragraph for spray finishing operations using flammable and combustible liquids were taken from NFPA-33-1969 and pertain to those hazards associated with fire protection or the removal of flammable vapor accumulation from the interior of the booth during spraying operations. This paragraph applies to maintaining the concentration of flammable vapors below the lower explosive limit (LEL) in a spray booth but does not apply to maintaining operator exposures to within the permissible exposure limits (PEL)."
2. OSHA Standard Interpretations 10/22/2001 - Clarification of minimum face velocity requirements for spray booths, October 22, 2001

*"**Question:** 29 CFR 1910.107(b)(5) only refers to a dry filter spray booth. What is the minimum air velocity requirement for a waterwash spray booth or an enclosed booth with no openings?*
***Reply:** OSHA currently does not have specific standards addressing velocity requirements for a waterwash spray booth or an enclosed booth with no openings. However, 1910.94(c)(6)(ii) requires that the vapor concentration in all area of the booth remain at a level below 25 percent of the lower explosive limit (LEL). This requirement corresponds to the requirements of NFPA 33, section 5.2, Ventilation, performance requirements (2000 edition)."*

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

2404.7.3-F-RAIFSNIDER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the velocity should be 100 fpm or 25% of the LFL, whichever is greater, since the characteristics of the spraying materials may vary considerably.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Geoffrey Raifsnider, Global Finishing Solutions, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

2404.7.3 (IMC [F] 502.7.3.3) Air velocity. <u>The ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust air flow below 25 percent of the contaminant's lower flammable limit (LFL). In addition, the spray booth shall be provided with mechanical ventilation so that the average air velocity through openings is in accordance with Sections 2404.7.3.1 and 2404.7.3.2 (IMC 502.7.3.3.1 and 502.7.3.3.2).</u> ~~Each spray area shall be provided with mechanical ventilation in accordance with Sections 2404.7.3.1 through 2404.7.3.3~~

2404.7.3.1 (IMC [F] 502.7.3.3.1) Open face or open front spray booth. For spray application operations conducted in an open face or open front spray booth, the ventilation system shall be designed, installed and maintained ~~such~~ <u>so</u> that the average air velocity into the spray booth through all openings shall be not less than 100 feet per minute (0.51 m/s).

> **Exception:** For fixed or automated electrostatic spray application equipment the average air velocity into the spray booth through all openings shall not be less than 50 feet per minute (0.25 m/s).

~~**2404.7.3.2 (IMC [F] 502.7.3.3.2) Enclosed spray booth or spray room.** For spray application operations conducted in an enclosed spray booth or spray room, the ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammable limit (LFL).~~

2404.7.3.2 (IMC [F] 502.7.3.3.2) Enclosed spray booth or spray room with openings for product conveyance. ~~In addition to the requirements of 2404.7.3.2,~~ <u>For spray application operations conducted in an enclosed spray booth or spray room with openings for product conveyance,</u> the ventilation system shall also be designed, installed and maintained so that the average air velocity into the spray booth through openings shall be not less than 100 feet per minute (0.51 m/s).

> **Exception<u>s:</u>**
>
> <u>1. For fixed or automated electrostatic spray application equipment the average air velocity into the spray booth through all openings shall not be less than 50 feet per minute (0.25 m/s).</u>
>
> <u>2</u>: Where methods are used to reduce cross drafts that can draw vapors and overspray through openings from the spray booth or spray room, the average air velocity into the spray booth or spray room shall be capable of capturing and confining vapors and overspray to the spray booth or spray room.

Commenter's Reason: Original proposal has been revised to establish the overall requirement that concentration in the exhaust must be kept below 25% of the LFL. The characteristics of the materials being sprayed must be taken into account to determine the amount of air exhausted.

It has also been revised to include the minimum velocity requirements through conveyor openings for capture and confinement of overspray and vapors.

The following ventilation design basis for paint spray booths is common in the industry and has been effective in providing clean, safe and reliable painting environments which are in compliance with the intent of the International Fire Code, OSHA, and NFPA 33.

1. The total exhaust ventilation rate shall be based upon the minimum amount of air required to maintain the concentration of flammable vapors in the exhaust below 25%
2. Where appropriate the exhaust rate shall be increased by the amount of air needed to:
   a maintain a minimum average velocity through all openings which prevent the escape of overspray from the spray booth
   b achieve the desired collection of overspray toward the exhaust filters

c achieve the desired paint transfer efficiency

There are many types of booths and rooms in which the 100 fpm value within the spray area would be detrimental to the quality of the product and based upon the amount of paint used is well in excess of the minimum dilution air needed to keep the exhaust below 25% of the LFL. This extra air also increases the operating costs. The air velocities for a specific spray booth or spray room should be specific to the individual design that accomplishes the desired performance (i.e. 25% LFL or containment of overspray at openings).

This proposal does not require additional knowledge or tools for the AHJ. The designer or owner of the spray booth or room can provide calculations showing the minimum ventilation rate based upon the type and amount of paint being sprayed. The ventilation rate can be converted into an average velocity in the spray area. The AHJ can ask for balancing information to confirm the installation meets the code requirements or can independently measure the design velocity in the same manner as currently used by the AHJ to confirm 100 FPM.

F261-13

Final Action: AS AM AMPC____ D

F265-13
2810 (New), 2801.1

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com)

Add new text as follows:

SECTION 2810
WOOD AND PLASTIC PALLET STORAGE AND REHABILITATION

2810.1 General. All facilities with either storage or rehabilitation of pallets shall be in accordance with Sections 2810.2 through 2810.5.2 and Section 2803.

2810.2 Fire Flow. The minimum required fire flow in pallet storage yards exceeding 3200 sq feet of pallet storage areas shall be not less than 2,000 gpm (7571 L/m). For storage yards with stable piles greater that 6,200 sq. ft. (576 m2) the required fire flow shall be not less than 3,000 gpm (8516 L/m). Pallet storage yards shall not exceed the available fire hydrant flow and spacing.

2810.3 Fire Hydrants. Fire hydrants required for fire flow purposes for pallet storage arrays shall be installed in accordance with Section 507 within three hundred (300) feet (152.4m) of pallet locations measured along unobstructed access paths.

2810.4 Fire Department Access. Fire apparatus access roads in accordance with Section 503 shall be located within one hundred fifty (150) feet (45,720mm) of all portions of the pallet storage array(s). Permanent delineation of on-site fire apparatus access roads shall be provided as required by the fire code official.

2810.5 Idle Pallet Storage. Pallet storage shall be in compliance with Sections 2810.5.1 or 2810.5.2 as applicable.

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1. Stacks shall not exceed a height of fifteen (15) ft. (4.57 m).
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.
3. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage area.
4. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.
5. Stacks shall be arranged to form stable piles.
6. Piles shall not contain more than six thousand (6,000) cu. ft. (170 m3) of pallets.
7. Piles shall be separated from other piles by a minimum distance of eight (8) ft. (2.44 m).
8. Piles shall be arranged in a grid system to form pallet storage arrays with a maximum dimension of fifty (50) ft. by fifty (50) ft. (15.25 m by 15.25 m).
9. Pallet storage arrays shall be separated by a minimum distance of twenty four (24) ft. (7.32 m).

2810.5.2 Exterior storage not greater than 3200 sq ft in area. Exterior pallet storage not greater than 3200 square feet shall comply with all of the following:

1. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage.
3. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.

Exception: Where approved by the fire code official, stacks located closer than fifteen (15) ft. to an on-site structure shall maintain minimum horizontal clearances based on the quantity of pallets and the level of protection provided by the building construction as follows:

1. The minimum horizontal clearance for 50 pallets or less adjacent to a masonry wall without openings located within twenty (20) ft. (6 m) horizontally of the pallet stacks, or adjacnt to a masonry wall with 2 hour fire-resistance rated protected openings shall be zero (0) feet (0 m).
. The minimum horizontal clearance for 51 to 200 pallets adjacent to a masonry wall without openings located within twenty (20) ft. (6 m) horizontally of the pallet stacks, or a masonry wall with 2 hour fire-resistance rated protected openings shall be eight (8) feet (2.44 m).
3. The minimum horizontal clearance for 50 pallets or less adjacent to a wood or metal building equipped throughout with an approved automatic sprinkler system shall be eight (8) ft. (2.44 m).
4. Stacks located less than fifteen (15) ft. (4.57 m) from an exterior building wall shall not exceed a height equal to thirty (30) inches below the roof line elevation, or fifteen (15) feet (4.57 m), whichever is less.
5. Stacks shall be arranged to form stable piles.

Revise as follows:

SECTION 2801
GENERAL

2801.1 Scope. The storage, manufacturing and processing of timber, lumber, plywood, non-metallic pallets, veneers and byproducts shall be in accordance with this chapter.

Reason: There have been an increasing number of large scale fires involving the repair and outdoor storage of combustible pallets. Numerous local jurisdictions have been adding local requirements to their fire code adoptions to deal with this increased fire threat. These new requirements are to provide code language in the IFC addressing the high challenge fire protection issues involving large amounts of idle pallets. The concepts for the technical language in this proposal were taken from the Clark County, Nevada fire code amendments, a county that has dealt with large scale fires and developed the requirements in response to those conflagrations.

Section 2810.2 specifies that the requirements apply to facilities that store or rehabilitate wood or plastic pallets. The rehabilitation activities include storage along with additional hazards introduced by the rehabilitation activities.

Fires in pallet storage areas are fast growing and spreading requiring an adequate fire flow. Threshold of 2,000 GPM for greater than 3,200 sq. ft. of storage will provide for up to 4 - 500 GPM master stream appliances to be utilized when required, increasing to 3,000 GPM when piles larger than 6,200 sq. ft. exist.

Referring to IFC Table B105.1 for required fire flows the 2,000 GPM requirement is for Type V-B buildings of 4,401 - 6,200 sq. ft., since the open array of the pallets provide for a faster fire spread and greater need for master stream appliances than a completed building typically would, the 2,000 GPM is appropriate for the minimum flow required. Since pile size is and separation from individual piles is provided for in Section 2810.5 a fire flow 3,000 GPM was utilized for areas of storage over 6,200 sq. ft.

Fire department access roads are required in section 2810.4.

Section 2810.5 provides for the storage arrangement of piles and stacks addressing height, maximum pile size and distances from exposures. A stack is an individual stack of pallets, a pile is a group of 2 or more stacks of pallets grouped together.

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

2801.1-F-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

SECTION 2810
EXTERIOR WOOD AND PLASTIC PALLET STORAGE AND REHABILITATION

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1. Stacks shall not exceed a height of 18 feet. ~~fifteen (15) ft. (4.57 m).~~
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.
3. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage area.
4. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.
5. Stacks shall be arranged to form stable piles.
6. Piles shall not contain more than six thousand (6,000) cu. ft. (170 m3) of pallets.
7. Piles shall be separated from other piles by a minimum distance of eight (8) ft. (2.44 m).
8. Piles shall be arranged in a grid system to form pallet storage arrays with a maximum dimension of fifty (50) ft. by fifty (50) ft. (15.25 m by 15.25 m).
9. Pallet storage arrays shall be separated by a minimum distance of twenty four (24) ft. (7.32 m).

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee approved the code change based on the proponent's reason statement. It was noted by the committee that the proposal needs further clarification regarding its applicability to exterior only and should provide guidance for inside operations as well. Clarification is also needed to indicate that the fire flows for the pallet storage would be in addition to any other required fire flows for the site or buildings on it. The modifications clarify that the section is applicable to exterior storage & rehab only and recognize that current industry practices need a stack height of 18 feet.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Robert J Davidson, Davidson Code Concepts, LLC , representing self; Sean DeCrane, representing Cleveland Division of Fire / International Association of Fire Fighters, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.1 General. All facilities with either exterior storage or exterior rehabilitation of pallets shall be in accordance with Sections 2810.2 through 2810.5.2 and Section 2803.

2810.1.1 Interior storage or rehabilitation. The interior storage or rehabilitation of pallets shall be in compliance with the applicable portions of this code and the *International Building Code*.

2810.2 Fire Flow. The minimum required fire flow in pallet storage yards exceeding 3200 sq feet of pallet storage areas shall be not less than 2,000 gpm (7571 L/m). For storage yards with stable piles greater that 6,200 sq. ft. (576 m2) the required fire flow shall be not less than 3,000 gpm (8516 L/m). The fire flow for a pallet storage yard shall be in addition to any fire flow otherwise required for the site or buildings located on the site. Pallet storage yards shall not exceed the available fire ~~hydrant~~ flow ~~and spacing~~.

2810.3 Fire Hydrants. Fire hydrants required for fire flow purposes for pallet storage arrays shall be installed in accordance with Section 507 within three hundred (300) feet (152.4m) of pallet locations measured along unobstructed access paths.

2810.3.1 Areas without water supply systems. For fire hydrants and water supplies in rural and suburban areas in which adequate and reliable water supply systems do not exist, NFPA 1142 or the International Wildland-Urban Interface Code shall be permitted to be utilized, when approved by the fire code official.

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1. Stacks shall not exceed a height of 18 feet. ~~fifteen (15) ft. (4.57 m).~~
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater. The separation distance is allowed to be reduced when the fire code official determines that no hazard to the adjoining property exists.
3. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage area.
4. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.
5. Stacks shall be arranged to form stable piles.

6. Piles shall not contain more than ~~six thousand (6,000) cu. ft. (170 m3)~~ seven thousand two hundred (7200) cu. Ft. (204 m3) of pallets.
7. Piles shall be separated from other piles by a minimum distance of eight (8) ft. (2.44 m).
8. Piles shall be arranged in a grid system to form pallet storage arrays with a maximum dimension of fifty (50) ft. by fifty (50) ft. (15.25 m by 15.25 m).
9. Pallet storage arrays shall be separated by a minimum distance of ~~twenty four (24) ft. (7.32 m)~~ twenty (20) ft. (6096 mm).

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The purpose of this public comment for modification is to address committee requests for clarification, to coordinate provisions with this new section of code with other portions of the fire code and to address some concerns/request for clarification raised by industry interested parties.

The word "exterior" has been added to two places in Section 2810.1 and a new Section 2810.1.1 has been added as requested by the committee to clarify that this new section is for exterior activities and that interior activities shall comply with other appropriate sections of the fire code.

Section 2810.2 has been modified as requested by the committee to clarify that the fire flow for this activity is separate from other required fire flows for the site. The reference to fire hydrants has been deleted from this section since fire hydrants are covered by Section 2810.3.

A new Section 2810.3.1 has been added to clarify that for rural or suburban areas without adequate water supplies the fire code official can permit the use of either NFPA 1142 or the International Wildland-Urban Interface Code for establishing the needed fire flow. Currently similar language is located in Appendix B of the code and fire code officials know to go there for guidance when applying Section 507 Fire Protection Water Supplies, however, a significant number of interested parties have inquired about facilities located in rural areas without public water systems and adding the clarification will provide for a more informed application of the new language and requirements.

Section 2810.5.1, Item 2 has been modified by adding language to give the fire code official the ability to allow a reduction in the required separation distance from property lines. This same language can be found in the exception to "Section 315.4 Outside storage" of the fire code. The addition is in response to industry questions and provides for a correlation with the existing code language.

Section 2810.5.1, Item 6 is modified by increasing the cubic footage per pile to 7,200 cu ft. This is needed to correlate with the modification the committee made to stack height during the hearing based upon an industry request, (changed 15 ft to 18 ft). The height and dimensions of the storage arrangement are related so an increase in the stack height requires a corresponding increase in the cubic feet of storage permitted per pile to match pile dimensions

Section 2810.5.1, Item 9 is proposed to be modified to reduce the array separation distance to 20 feet to correlate this distance with the dimension of a fire apparatus access road. In response to an industry request to consider this action, a review of the Clark County, Nevada adoption of similar requirements that was utilized for drafting of the IFC proposal identified that Clark County also increased their minimum fire apparatus roadway width to 24 feet. Since the two distances are correlated, this modification will correlate the measurements specified in this section of the new IFC language with the existing dimension for fire apparatus roads found at Section 503.2.1.

Public Comment 2:

Susan R. Jennings, President, Virginia Forest Products Association; Mike Mullin, Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.2 Fire Flow. The minimum required fire flow in pallet storage yards at facilities, buildings or portions of buildings hereafter constructed or moved into ~~exceeding 3200 sq feet of pallet storage areas~~ shall be not less than ~~2,000~~1,500 gpm (5678~~7571~~ L/m). ~~For storage yards with stable piles greater that 6,200 sq. ft. (576 m2) the required fire flow shall be not less than 3,000 gpm (8516 L/m).~~ Pallet storage yards shall not exceed the available fire hydrant flow and spacing.

> **Exception:** Where approved by the fire code official for rural areas or other areas with decreased fire flow capacity, the minimum required fire flow may be reduced below 1,500 gpm.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The fire flow proposal is based upon standards adopted by the Fire Department of Clark County, a populous county of roughly 2 million in the southern part of Nevada, encompassing Las Vegas, accounting for nearly three-quarters of the state's residents. The standards established by Clark County are not appropriately applied on a broad scale in the International Fire Code. Fire flow available in Clark County may not be available in many other areas where the IFC is adopted, particularly in rural areas. Moreover, in adopting the standards for its jurisdiction, Clark County had significant information regarding and control over the fire flow available within the county. By contrast, the standard proposed for adoption in the IFC is suggested with no knowledge of, let alone control over, the fire flow capacity of any particular jurisdiction.

Although Clark County established 2,000 gpm as the minimum fire flow for pallet storage areas, the Clark County standards refer to Appendix B, Table B105.1. A more appropriate minimum fire flow would be 1,500 gpm, the minimum flow established in Table B105.1. Additionally, the standard should explicitly provide an exception for rural areas or other areas with decreased fire flow capacity. This proposed exception is taken directly from Section 1412.2 of the Clark County standards.

Additionally, the “hereafter constructed or moved into” language should be added to ensure that the requirements of this section are only applied prospectively, consistent with Section 507.1 of the current IFC code.

Public Comment 3:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**2810.2 Fire Flow.** The minimum required fire flow in pallet storage yards exceeding 3200 sq feet of pallet storage areas shall be not less than 2,000 gpm (<u>5678</u> L/m). For storage yards with stable piles greater that 6,200 sq. ft. (576 m2) the required fire flow shall be not less than 3,000 gpm (8516 L/m). Pallet storage yards shall not exceed the available fire hydrant flow and spacing.~~

(Portions of proposal not shown remain unchanged)

Commenter’s Reason:

Jennings: The fire flow proposal is based upon standards adopted by the Fire Department of Clark County, a populous county of roughly 2 million in the southern part of Nevada, encompassing Las Vegas, accounting for nearly three-quarters of the state’s residents. The standards established by Clark County are not appropriately applied on a broad scale in the International Fire Code. Fire flow available in Clark County may not be available in many other areas where the IFC is adopted, particularly in rural areas. Moreover, in adopting the standards for its jurisdiction, Clark County had significant information regarding and control over the fire flow available within the county. By contrast, the standard proposed for adoption in the IFC is suggested with no knowledge of, let alone control over, the fire flow capacity of any particular jurisdiction.

Fire flow under the IFC is currently calculated pursuant to Appendix B, which is based upon the size and construction type of buildings. There is no indication that the current fire flow practice for buildings is insufficient to account for outdoor pallet storage. Accordingly, this section of the proposal should be removed.

McClendon: We understand the fire flow proposal is based upon standards adopted by the Fire Department of Clark County, a populous county of roughly 2 million in the southern part of Nevada, encompassing Las Vegas. Many of our company members are located in rural areas that do not meet the requirements in the proposal. Furthermore, many of these companies are family-owned operations with an average of 25 workers.

Clark County had significant information regarding and control over the fire flow available within the county. By contrast, the standard proposed for adoption in the IFC is suggested with no knowledge of, let alone control over, the fire flow capacity of any particular jurisdiction.

Further, the fire flow under the IFC is based on the size and construction type of buildings. There is no indication that the current fire flow practice for buildings is insufficient to account for outdoor pallet storage. Accordingly, this section of the proposal should be removed.

Public Comment 4:

Susan R. Jennings, President, Virginia Forest Products Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.3 Fire Hydrants. Fire hydrants required for fire flow purposes for pallet storage arrays <u>at facilities, buildings or portions of buildings hereafter constructed or moved into</u> shall be installed in accordance with Section 507 within three hundred (300) feet (152.4m) of pallet locations measured along unobstructed access paths <u>except as otherwise approved by the fire code official</u>.

(Portions of proposal not shown remain unchanged)

Commenter’s Reason: This proposed section references Section 507 of the IFC but does not incorporate the discretion provided to the fire code official under Section 507.5.1. Such discretion should be explicitly incorporated in the proposed standard.

Additionally, the “hereafter constructed or moved into” language should be added to ensure that the requirements of this section are only applied prospectively, consistent with Section 507.1 of the current IFC code.

Public Comment 5:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**2810.3 Fire Hydrants.** Fire hydrants required for fire flow purposes for pallet storage arrays shall be installed in accordance with Section 507 within three hundred (300) feet (152.4m) of pallet locations measured along unobstructed access paths.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings: Section 507 provides requirements for fire protection water supplies to "premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into." This requirement is duplicative of Section 507.1 and unnecessary. Accordingly, this section of the proposal should be removed.

McClendon: There are already requirements in Section 507 for fire protection water supplies to be available to "premises upon which facilities, buildings, or portions of buildings are hereafter constructed or moved into." This requirement is therefore unnecessary and the proposal should be removed.

Public Comment 6:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.4 Fire Department Access. Fire apparatus access roads in accordance with Section 503 shall be located within one hundred fifty (150) feet (45,720mm) of all portions of the pallet storage array(s) <u>at facilities, buildings or portions of buildings hereafter constructed or moved into the jurisdiction</u>. Permanent delineation of on-site fire apparatus access roads shall be provided as required by the fire code official.

> <u>**Exception**: The fire code official is authorized to increase the dimension of 150 feet where fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.</u>

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings/Mullin: This proposed section references Section 503 of the IFC but does not incorporate the discretionary exception for the fire code official under Section 503.1.1. This discretionary exception should be explicitly incorporated in the proposed standard.

Additionally, the "hereafter constructed or moved into" language should be added to ensure that the requirements of this section are only applied prospectively, consistent with Section 503.1.1 of the current IFC code.

McClendon: Local fire officials must have the ability to apply their discretion to decision making based on unique conditions in their jurisdiction. This proposed section references Section 503 of the IFC but does not incorporate the discretionary exception for the fire code official under Section 503.1.1. This discretionary exception should be explicitly incorporated in the proposed standard.

Additionally, the "hereafter constructed or moved into" language should be added to ensure that the requirements of this section are only applied prospectively, consistent with Section 503.1.1 of the current IFC code.

Public Comment 7:

Susan R. Jennings, President, Virginia Forest Products Association, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**2810.4 Fire Department Access.** Fire apparatus access roads in accordance with Section 503 shall be located within one hundred fifty (150) feet (45,720mm) of all portions of the pallet storage array(s). Permanent delineation of on-site fire apparatus access roads shall be provided as required by the fire code official.~~

Commenter's Reason: Section 503.1 provides requirements for fire department access to all portions of the facility. This requirement is duplicative of Section 503.1 and unnecessary. Accordingly, this section of the proposal should be removed.

(Portions of proposal not shown remain unchanged)

Public Comment 8:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5 Idle Pallet Storage. Pallet storage <u>at facilities, buildings or portions of buildings hereafter constructed or moved into the jurisdiction</u> shall be in compliance with Sections 2810.5.1 or 2810.5.2 as applicable.

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings/Mullin: The pallet storage requirements in the proposal, if applied retroactively, could cause significant reduction in available outdoor pallet storage space at existing facilities. The proposal identifies only an increased cost of construction, suggesting that the rule is not intended to require changes in storage practices at existing facilities. This should be specifically stated in the standard. Accordingly, the "hereafter constructed or moved into" language should be added to ensure that the requirements of this section are only applied prospectively, consistent with other sections of the current IFC code affected by this proposal.

McClendon: Companies in our industry have estimated that this proposal, if applied, would cause significant reduction in available outdoor pallet storage space with losses reported as high as 60 percent. The proposal identifies only an increased cost of construction, suggesting that the rule is not intended to require changes in storage practices at existing facilities. For clarity throughout the industry, this should be specifically stated in the standard. Accordingly, the "hereafter constructed or moved into" language should be added to ensure that the requirements of this section are only applied prospectively, consistent with other sections of the current IFC code affected by this proposal.

Public Comment 9:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1. Stacks shall not exceed a height of fifteen (15) ft. (4.57 m).
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line~~ or a distance equal to the stack height, whichever is greater~~.

3 through 9 *(No change to text)*

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings/Mullin: Section 2810.5.1(1) allows stack heights up to 18 feet; therefore, this Section 2810.5.1(2) sets a de facto minimum separation of 18 feet from the property line. No justification for this 18-foot separation has been articulated. Under NFPA

1 Section 34.10.4, only eight (8) feet of separation from the property line is required. This provision should be amended to require only eight (8) feet minimum separation, consistent with NFPA 1.

McClendon: Section 2810.5.1(1) allows stack heights up to 18 feet; therefore, this Section 2810.5.1(2) sets a de facto minimum separation of 18 feet from the property line. No justification for this 18-foot separation has been articulated. Under NFPA 1 Section 34.10.4, only eight (8) feet of separation from the property line is required. This provision should be amended to require only eight (8) feet minimum separation, consistent with NFPA 1.

Public Comment 10:

Susan R. Jennings, President, Virginia Forest Products Association and Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1 through t 5 *(No change to text)*
6. Piles shall not contain more than 7,200 ~~six thousand (6,000)~~ cu. ft. (204 ~~170~~ m3) of pallets.
7 through 9 *(No change to text)*

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The proposal of 6,000 cubic feet was based upon a pile size of 20 feet by 20 feet at a height of 15 feet. When the stack height was increased to 18 feet during the committee meetings, there was no corresponding change to the pile size. This change is necessary to maintaining uniform pile sizes.

Public Comment 11:

Susan R. Jennings, President, Virginia Forest Products Association and Brent McClendon, President/CEO, National Wooden Pallet and Container Association, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1 through t 5 *(No change to text)*
~~6. Piles shall not contain more than six thousand (6,000) cu. ft. (170 m3) of pallets.~~
7 through 9 *(No change to text)*

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings: Section 2810.5.1(6) should be deleted. Once the stack height has been limited, and the spacing between pallet storage arrays, there is no reason to also limit pile size. This is a redundant and duplicative standard that does not appear to provide any additional fire protection benefit. Moreover, the fact that Clark County, Nevada, limits piles to 20 feet by 20 feet does not make this the appropriate standard. As another example, the West Sacramento, California, fire code limits pallet stack sizes for outdoor storage to 25 feet by 100 feet, or 2500 square feet. There is no clear justification for the stated pile size limitation. Accordingly, this provision should be deleted.

McClendon: In other parts of the code, the stack height limits have been specified as well as the spacing between the pallet stacks and there is no safety benefit of setting a pile size limit. The fact that Clark County, Nevada, has chosen to limits piles to 20 feet by 20 feet does not make this the best standard nationally. As another example, the West Sacramento, California, fire code limits pallet stack sizes for outdoor storage to 25 feet by 100 feet, or 2500 square feet. There is no clear justification for the stated pile size limitation. Accordingly, this provision should be deleted.

Public Comment 12:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1 through t 6 *(No change to text)*
~~7. Piles shall be separated from other piles by a minimum distance of eight (8) ft. (2.44 m).~~
8 through 9 *(No change to text)*

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings: Section 2810.5.1(7) should be deleted. No justification has been articulated for this separation between piles. The separation between pallet storage arrays is designed to provide fire apparatus access roads, which are typically 20 feet. This 8-foot separation does not provide fire apparatus access and does not appear to be rationally related to any fire control access requirement. Adding this pile separation within the 50-foot storage arrays reduces the available storage area within an array by 36% without any additional fire protection benefit. Accordingly, this provision should be deleted.

McClendon: This appears to be an arbitrary requirement since it is not enough space to create a fire access road (20-feet) nor does it appear to provide a significant fire control benefit. Adding this pile separation within the 50-foot storage arrays reduces the available storage area within an array by 36% without any additional fire protection benefit. Accordingly, this provision should be deleted.

Mullin: Section 2810.5.1(7) should be deleted. No justification has been articulated for this separation between piles. The separation between pallet storage arrays is designed to provide fire apparatus access roads, which are typically 20 feet. This 8-foot separation does not provide fire apparatus access and does not appear to be rationally related to any fire control access requirement. Adding this pile separation within the 50-foot storage arrays reduces the available storage area within an array by 36% without any additional fire protection benefit.

Moreover, the fact that Clark County, Nevada, limits piles to 20 feet by 20 feet while requiring an additional 8-foot separation does not make this the appropriate or necessary standard. As another example, the West Sacramento, California, fire code limits pallet stack sizes for outdoor storage to 25 feet by 100 feet, or 2500 square feet. There is no clear justification for the stated separation between individual piles. Removing the 8-foot separation and keeping the 50 foot by 50 foot array size would effectively limit pile sizes to 2500 square feet, the same as the West Sacramento standard. Accordingly, this provision should be deleted.

Public Comment 13:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1 through t 8 *(No change to text)*
9. Pallet storage arrays shall be separated by a minimum distance of twenty ~~four~~ (20 24) ft. (6.1 ~~7.32~~ m).

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings/Mullin: This provision was designed to create fire apparatus access roads between pallet storage. The normal width of a fire apparatus access road is 20 feet. No justification was articulated for requiring 24 feet between pallet arrays instead of 20 feet. This additional 4 feet of separation between pallet arrays decreases available storage space by almost 1000 square feet for every four pallet storage arrays within the storage area, without providing any additional fire protection benefit.

McClendon: The normal width of a fire apparatus access road is 20 feet. No justification was expressed for requiring an additional 4 feet between pallet stacks. This additional 4 feet of separation decreases available storage space by almost 1000 square feet for every four pallet storage arrays within the storage area, without providing any additional fire protection benefit. This would create a significant loss of property use for the majority of our members.

Public Comment 14:

Susan R. Jennings, President, Virginia Forest Products Association; Brent McClendon, President/CEO, National Wooden Pallet and Container Association; Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

2810.5.2 Exterior storage not greater than 3200 sq ft in area. Exterior pallet storage not greater than 3200 square feet shall comply with all of the following:

1. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line~~ or a distance equal to the stack height, whichever is greater~~.

2 and 3 *(No change to text)*

(Portions of proposal not shown remain unchanged)

Commenter's Reason:

Jennings/Mullin: No justification has been articulated for requiring additional spacing between pallet stacks and the property line. Under NFPA 1 Section 34.10.4, only eight (8) feet of separation from the property line is required. This provision should be amended to require only eight (8) feet minimum separation, consistent with NFPA 1.

McClendon: Eight feet of space from the property line should be adequate for safety whether the stack is 8 ft. or the allowed 18 ft. No justification has been referenced for imposing a different property line spacing based on stack height. Under NFPA 1 Section 34.10.4, only eight (8) feet of separation from the property line is required. This provision should be amended to require only eight (8) feet minimum separation, consistent with NFPA 1.

Public Comment 15:

Kathleen Dietrich, Commercial Lumber and Pallet Company, Inc; Bernie Kamps, CEO, Kamps Pallets, Inc; Lawrence A. Konz, Konz Wood Products; Joseph O'Brien, Industrial Pallet, LLC; Terry Rodino, Duro Recycling Inc; James Ruder, L&R Pallet Service; James S. Schwab, Pallet Logistics of America; Steen Yelland, J.F. Rohrbaugh Co., Inc, request Disapproval.

Commenter's Reason:

Dietrich: Commercial lumber and Pallet Company has been in business since 1941 and has two locations in California employing over 200 people. We are a family owned and operated business and view our employees as our #1 asset. We have an extensive safety program and housekeeping at both locations and we are pleased to state that as a result, our Experience Modification is 80%. We are 100% recyclable and are also pleased that we have achieved SFI certification in Sustainable Sourcing. We strongly care about our people and our environment.

Kamps: Code Change Proposal F265-13 should be disapproved. As an owner of a 600 employee pallet recycling and new pallet manufacturing company in 4-5 Midwestern states for 40 years, this proposal will adversely impact our company. Our 10 plants have safety programs that we adhere to and fire safety is very important to us.

O'Brien: Industrial Pallet, LLC has been in business for 15 years. We are located in the rural northeastern portion of Connecticut and employee 65 people. We worked closely with our volunteer fire department on safety and access issues when we built our plant. Our insurance underwriter inspects our facility annually. We comply with all the recommendations. Because of our rural location we have no hydrant systems and must rely on good judgment and the timely response of volunteers. In fifteen years we have not had to call the fire department once nor have we ever had a property damage claim related to fire with our insurance company.

Ruder: This is the first time I have ever participated in the public comment process for fire code development. We are a family owned and operated business celebrating 40 years of service across the entire state of Colorado and shipping to customers within a 600 mile radius of Denver. We currently employ 115 people (families) and take their safety and well being very seriously. This proposal is of major concern because it will be detrimental to our way of doing business and our ability to support the families that have devoted years of their lives to our company.

I feel the need to participate in this public comment process for two reasons: First, if the above referenced fire code proposal is implemented; it would have significant negative consequences to my company. On average, our industry would lose more than 30 percent of the use of our yard storage to this rule. There is no data present in the proposal to support the necessity of a change of such enormous proportions. The storage of pallets themselves proposes no danger. It is easy to do in a organized and methodical manner. My facility is located on a 7 acre site. More than ½ of this property is dedicated to the outdoor storage of product and I could not operate without the ability to accommodate the "seasonal" inbound and outbound fluctuations associated with recycled pallets and lumber. The nature of the business is that you must "store" the pallets in large mass when you can find them so you have them available for when you cannot. These swings are very cyclic.

Schwab: My name is Jim Schwab and I am President of Pallet Logistics of America. We are a privately hend company headquartered in Dallas, TX. We are also the largest independent pallet recycling and services company in the South Central United States. With over 300 employees serving over 600 customers from 5 locations in Texas and Oklahoma, we have developed a "Best in Class" reputation for operating with excellence across the board. Safety and Cleanliness go hand and hand and are 2 of the 7 core values we espouse as an organization, so this topic is very important to me and our employees.

Yelland: The Rohrbaugh Company is a fifth generation family business started in 1880. We have 65 full-time employees. We have worked closely to implement suggestions and input in regards to corporate safety from our local fire chief and insurance vendors to insure a safe working environment for our employees.

ALL: This is the first time I have ever participated in the public comment process for fire code development. I am doing so for two reasons. First, if the above referenced fire code proposal is implemented, it would have significant negative consequences to my company. On average, our industry would lose more than 30 percent of the use of our yard storage to this rule. There is no data present in the proposal to support the necessity of a change of such enormous proportions.

Secondly, as a member of the board of directors of the National Wooden Pallet & Container Association (NWPCA) I am troubled that the International Code Council (ICC), when considering an issue that would directly impact the wood pallet and container industry, failed to reach out to our association's professional staff or elected leadership.

It is in the best interest of our companies to protect our products, facilities and workers; safety is a priority for me and my industry colleagues. The association has a safety manual available to members that covers the broad range of potential risks involved in the manufacturing and repair of wood pallets including fire safety and posts safety articles on our website on a continuing basis.

Our association worked in collaboration with the National Association of State Fire Marshalls (NASFM) on an education module. We have demonstrated our commitment to safety and have a unique and thorough knowledge of pallet storage in both warehouses and outdoors.

The proposal says the code changes were developed in response to "an increasing number of large scale fires," in the outdoor storage of pallets. There is no aggregate data on these series of fires in the proposal nor even the description of the conditions of a single fire. Lacking reliable aggregated data, there is no way to draw dependable conclusions as to 1) whether or not there is a problem so profoundly unmet by the existing code that it warrants a vast loss of property use by business owners, and 2) would this proposal solve such a problem? If this information has been collected, it has not been distributed to the wood pallet industry, and we are the ones who will be most impacted.

As a board member, elected by my colleagues in the association to represent their interests, I urge the ICC to vote to disapprove this proposal in favor of working collaboratively with the wood pallet industry to establish necessary and workable safety procedures.

Public Comment 16:

Susan R. Jennings, President, Virginia Forest Products Association, requests Disapproval.

Commenter's Reason: Code Change Proposal F265-13 should be disapproved. The changes would impose a significant loss of facility usage to wood packaging companies and the thousands of businesses in hundreds of industries that rely on wood pallets to transport and store their products. We have seen no data that that would justify modifications to the code that would impose such a hardship on our industry.

VFPA is a state trade association serving the Commonwealth's $25+ billion forest products industry, and 2008 marked our 50th Anniversary providing support to our membership. We currently have more than 200 companies representing a broad range of facilities, including lumber mills, pallet plants, wood treaters, timber harvesters, and associated organizations. VFPA co-sponsors ExpoRichmond, America's leading trade show for the forest products industry, biennially. We are proud to say one of the major business focuses of our membership and Expo Richmond is the production and rehabilitation of wooden pallets in the Commonwealth. Our membership represents core businesses affected by the proposed rule change by the International Code Council.

On average, pallet industry companies employ more than 40 workers each. Nationally, the industry accounts for more than 50,000 jobs and payroll surpassing $1 billion. The majority of these companies are located in economically depressed areas with few alternative employment opportunities. The total economic value of the wooden pallet industry exceeds $15 billion annually. Recognizing wood pallets and containers are produced from sustainable materials, reusable, repairable and recyclable, the global marketplace utilizes wooden pallets for more than 93% of its needs. The pallet and container industry, related Associations, and individual members are fully committed to industry and individual safety within ours and associated industries. While the proposed standards address purported safety issues, VFPA respectfully contends the proposed changes unfairly analyze and apply the proposed standards across the industry without the appropriate and necessary input from member organizations and/or representatives.

As wooden pallets and containers are an essential component of the global industry, the development of a new standard for which the industry has unique knowledge regarding, VFPA is disappointed the ICC failed to contact industry members or Associations representing such. The National Wooden Pallet & Container Association is a leading representative of the industry and its members and VFPA has close ties and works cooperatively with NWPCA. VFPA has been alerted to the proposed rule changes by the ICC through our association with NWPCA and fully support the inclusion of NWPCA representatives in an issue that will so tremendously affect our industry. At this late stage in the process, VFPA fully supports NWPCA and their comments submitted regarding the proposed changes to the rule and lack of access to the complete data and analysis utilized in this process. In reviewing the proposed rule change, analysis of the new requirements and the potential impact of the changes required under the new standards, our members conclude the economic impact to their businesses will range in a 15 to 60 percent loss of their pallet yards. While our membership includes companies as large as Fortune 500 entities, the overwhelming majority of our group can be best characterized as family businesses, where minimal margins already exist. This additional change in stacking patterns will cause tremendous hardship and potential business closure due to the decreased production and storage capability, thereby limiting income producing activities related to pallets. Additionally, in areas where expansion may be cost prohibitive, the simple inability to expand due to the proposed changes may cause businesses to shut down.

We additionally voice our concerns regarding the methodology and data specifically:

- The revision consideration indicates “an increasing number of large scale fires involving the repair and outdoor storage of combustible pallets.” VFPA feels this statement is a broad, sweeping generalization and requests further information on the specific count of fires in the years prior to the proposed change. Additionally, the parameters distinguishing “large scale” from other classifications are vague and as such, immeasurable.
- By what percentage has the number of fires attributed to combustible pallets increased over previous years? And by what percentage does the ICC anticipate the proposed change to decrease the number?
- Were injuries to workers or damage due to the fires on the rise? And if so, the analysis of such.
- Any further analysis regarding cause, nature and incidents encountered regarding the referenced fires causing this sweeping change would be appreciated.
- This proposed change requires significant and sweeping changes within the pallet industry and to its members. The significant loss of use of facilities members face is overwhelming to those already fighting the ongoing challenging economic environment. VFPA encourages an in-depth analysis of risk vs. return with regard to business operations and the combustible pallet industry as a whole.

The wood packaging industry will face significant negative consequences if this proposal is passed as it currently exists. At a minimum, our industry deserves to have access to the data upon which this decision has been made and provide alternative solutions. In full support of NWPCA, Virginia Forest Products Association recognizes that a lot of work has already been done by ICC committees in developing the modified code, however, we believe it is imperative that the industry have the chance to lend our expertise to the process and request representatives of NWPCA, its member organizations, or duly authorized representatives be included in a collaborative work group that can effectively meet the safety goals and be less financially impactful thereby allowing a more comprehensive embrace by the wood packaging community.

Public Comment 17:

Brent McClendon, President/CEO, National Wooden Pallet and Container Association, requests Disapproval.

Commenter’s Reason: Code Change Proposal F265-13 should be disapproved. NWPCA represents the entire pallet manufacturing and recycling industry in the U.S. We are comprised of more than 600 company members. As a trade organization, when NWPCA submits comments, its conclusions have gone through a deliberative process by numerous industry representatives and represent a consensus of the industry.

The changes would impose a significant loss of facility usage to wood packaging companies and the thousands of businesses in hundreds of industries that rely on wood pallets to transport and store their products. We have seen no data that that would justify modifications to the code that would impose such a hardship on our industry.

The National Wooden Pallet and Container Association (NWPCA), the largest wood packaging trade association in the world was not included in the development of the proposal. NWPCA worked for six months with the National Association of State Fire Marshalls (NASFM) on a fire safety education module addressing pallet stacking in warehouses and would have been supportive of lending our expertise to a similar collaborative effort with the ICC on this issue.

The reason cited for the proposed changes is “an increasing number of large scale fires involving the repair and outdoor storage of combustible pallets.”

- What was the number of fires nationally in the years prior to the decision to change the code?
- By what percentage had the number of fires increased over previous years?
- Were injuries to workers or damage to property increasing? If yes, by what percentage?
- By what percentage does ICC expect to decrease the number of fires or property damage with the change in the code?
- In a risk/reward analysis what was the committee’s estimate of the percentage increase in safety vs. the percentage of loss of property usage?

The wood packaging industry will face significant negative consequences if this proposal is passed as it currently exists. At a minimum, our industry deserves to have access to the data upon which this decision has- been made and provide alternative solutions. NWPCA recognizes that a lot of work has already been done by ICC committees in developing the modified code. We believe it is imperative that as the key stakeholder, we be given the chance to lend our expertise to the process. It is better to disapprove the code at this time and give NWPCA and the ICC committee the opportunity to develop a collaborative work product that would meet the safety goals and be embraced by the wood packaging community.

Public Comment 18:

Mike Mullin, Director of Government Affairs – Americas, Brambles Limited, representing Brambles Limited, requests Disapproval.

Commenter's Reason: On behalf of Brambles Limited and its operating companies (Brambles), we are requesting that Code Change Proposal F265-13 be disapproved.

Brambles is a pooling solutions company specializing in the provision of reusable pallets, crates, containers, and associated logistics services. Its Americas headquarters is located in Atlanta, Georgia. Brambles operates across multiple industry supply chains in more than 50 countries. Its pooling solutions are operated under two core brands:

"CHEP" is a pooling solutions business specializing in the provision of reusable pallets, crates, containers, and associated logistics services. CHEP owns and manages approximately 300 million pallets, crates and containers in more than 50 countries.

"IFCO" operates a pool of more than 150 million reusable plastic crates (RPCs) worldwide and, in the USA, sorts, repairs, and reissues about 200 million pallets a year through its pallet management network.

In all of its operations, Brambles is committed to sustainability and corporate social responsibility. In this regard, Brambles' objective is to be recognized by its customers, employees, shareholders, and the community as a global leader in corporate responsibility and sustainability.

As a leader in the pallet industry, we consider partnering with stakeholders, particularly regulators and communities, very important. Accordingly, we engage transparently with public officials who serve our local, state, and federal governments. We welcome the opportunity to provide expertise and insights on various issues. In the normal course of our business, we work in a positive way with those agencies that regulate aspects of our business. We respond to requests from regulators when they seek to know how their rulemaking will impact our business and our customers.

Regrettably, we and our industry have become aware of this potential change to the International Fire Code (IFC) only after it had first moved through the committee. Unfortunately, there is no requirement for the proponent of the proposal to seek out input from the affected parties. Having said that, we recognize that we must be more vigilant in engaging with the International Code Council (ICC), and we intend to do so in earnest beginning with the October meeting. In this spirit, when we learned of the proposal, we reached out to its proponent, Bob Davidson, to gain a better understanding of the impetus behind the proposal. We appreciate Mr. Davidson's willingness to explain his rationale for introducing the proposal and only wish that he had reached out to the industry in advance so that we would not be in a position to now ask that this code change proposal be disapproved. We believe that if there are legitimate issues regarding the outdoor storage of pallets, they should be addressed in a spirit of partnership in which industry, insurance, and fire experts can come together and jointly develop approaches that protect the well-being of communities.

The justification for the proposal generically refers to an increasing number of fires involving repair and outdoor storage of pallets but does not specifically identify any such fires or provide data to support that fires associated with pallet storage are actually increasing, either in frequency of occurrence or severity of the loss. Accordingly, the proponent has not identified – and Brambles is not aware of – any distinct hazard to life or property being addressed by the proposal. Indeed, we have not been made aware of any fire safety-related issues with outdoor pallet storage or water supply or access or fire department access to pallet storage facilities. None of these issues have been raised by the fire professionals who visit our facilities each year. None have been raised by our insurers or other stakeholders.

Under those circumstances, and in the absence of any imminent or distinct hazard, we would seek to find common ground and use available data to determine whether the risk actually justifies a significant change to the code. If so, any changes should be based upon a consideration of all these factors. Instead, this proposal is developed based upon standards adopted by the Fire Department of Clark County, a populous county of roughly 2 million in the southern part of Nevada, encompassing Las Vegas, accounting for nearly three-quarters of the state's residents. The standards established by Clark County are not appropriately applied on a broad scale in the IFC. Whereas Clark County has significant access to information regarding and control over issues like fire flow, fire hydrant placement, and other requirements covered by this proposal, this proposal is made without specific information or knowledge of these issues for each jurisdiction, let alone control over them.

In closing, we sincerely respect Bob Davidson's initiative, and Brambles would like to partner with Mr. Davidson and the ICC to develop appropriate outdoor pallet storage requirements that provide sufficient fire safety protection but also take into account the practicalities and realities of effectively managing fire risks associated with outdoor pallet storage. Based upon our business model and mission, as described above, we believe we are uniquely suited to assist in such an endeavor. Such an effort could take place in the next code development cycle and be ready in time for submittal for consideration in 2016.

However, we must request that the current proposal be disapproved. A fundamental problem with adopting the proposal as drafted as part of the current cycle is that it appears to impose retroactive requirements on existing facilities and operations, contrary to many of the other sections of the IFC on which the proposal relies upon for its provisions. Some of these changes will significantly reduce outdoor storage capacity at some Brambles' facilities. Accordingly, Brambles believes the best course of action is to disapprove the proposal entirely. However, in the spirit of communication and cooperation, Brambles is also providing specific suggested revisions that it believes would make the proposal more manageable from an industry perspective without any reduction in fire protection benefits or safety.

Public Comment 19:

Jordan Piland, Atlas Division of Williamsburg Pallets/A Millwork Corporation, requests Disapproval.

Commenter's Reason: I am a stakeholder whose company will be significantly impacted if the above referenced change of the fire code is implemented. My company is Atlas Pallets/ A Division of Williamsburg Millwork Corporation located in Bowling Green, Virginia, a relatively rural area. We are a family owned and operated company; my father is president and I am vice president. We employee 56 workers.

As chairman of the Standards Committee for the National Wooden Pallet & Container Association, I am very involved in debating and analyzing standards for the industry at a detailed level. With regard to the proposed fire code change, I met with a task group to discuss the ramifications of the proposed changes. That same day I met with my local fire chief to discuss the specific implications of the proposal to Caroline County.

My county fire chief pointed out that the maximum pump capacity in the county is 1,250 gallons per minute; the biggest tanker is 3,000 gallons. The International Code Council (ICC) proposal would force most location to have multiple fire hydrants; this is rate in rural areas like mine.

Most concerning is that this standard would severely limit then number of pallets stored on the yard of my company. Tis would mean a significant loss of use of my property.

Years past, we met with our local fire department to discuss fire truck access to our plant. We have lanes that are kept open so that in the event of a fire, fire trucks have easy access to our pallet storage area. This proposal goes far beyond what we considered a good safe practice.

I have seen the proposal, but while the changes are proposed as a result of “an increasing number of large scale fires,” it does not identify any fires in which pallet stacking patters limited the fire fighters’ ability to access areas key to putting out the fire. As someone who has spent a great many years working on industry standards with colleagues from around the country, I know that to get buy-in from the industry at large, we must provide specific examples of the need for change, data to support the severity and scope of the problem, and a risk/reward analysis demonstrating that the change is proportionate to the hazard involved. If this information has been collected, it has not been distributed to the wood pallet industry.

I ask as both a pallet company owner and as the chairman of the industry standards committee that the ICC defer voting on this proposal until the pallet industry has time to work collaboratively with you on establishing necessary and workable safety procedures.

F265-13

Final Action: AS AM AMPC____ D

F267-13
3103.3.1 (New)

Proposed Change as Submitted

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Add new text as follows:

3103.3.1 Special Amusement. Tents and other membrane structures erected for the purpose of a *special amusement building* shall comply with the provisions of Section 411 of the *International Building Code*.

Reason: The scoping language in Section 3101 doesn't leave much room for stepping outside Chapter 31 for proposed uses other than those contemplated in Chapter 31. However, temporary membrane structures are being used for an increasingly wider variety of occupancies. One of the more hazardous is special amusement buildings.

The growing popularity of haunted houses usually erected within a month of Halloween and dismantled shortly thereafter, has enticed producers to (try to) utilize temporary membrane structures for these events. Due to the intentionally disorienting nature of these occupancies, additional life-safety measures beyond those prescribed in Chapter 31 (which really only contemplates large, open, usually seated assembly occupancies) are required. The section cited in the IBC addresses temporary special amusement buildings as well as permanent, and provides established life-safety measures.

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

3103.3.1-F-EMERICK

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee's disapproval was based on its agreement with testimony that indicated that the proposal needs to be expanded to include all specific requirements for such structures rather than just a simple reference back to the IBC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brad Emerick, Denver Fire Department/Fire Prevention Division, representing Fire Marshal's Association of Colorado (FMAC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

3103.3.1 Special Amusement. Tents and other membrane structures shall not be used as ~~erected~~ ~~for the purpose of a~~ *special amusement buildings* ~~shall comply with the provisions of Section 411 of the International Building Code~~.

.

Reason: Based on direction from the state chapters of the fire code officials, the original language of this proposal was written to not prohibit the use of temporary membrane structures as special amusement buildings, but to permit them if the requirements in IBC Chapter 4 could be met – a tall order, but not technically impossible.

Based on the discussion of the code committee, the language was changed to the above.

F267-13

Final Action: AS AM AMPC____ D

F268-13
3103.9; 3103.9.1 (New), 3103.9.2 (New)

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

3103.9 Anchorage required. Tents or membrane structures and their appurtenances shall be adequately roped, braced and anchored to withstand the elements of weather and prevent against collapsing. ~~Documentation of structural stability shall be furnished to the fire code official on request.~~

3103.9.1 Structural design. Tents and membrane structures shall be designed and constructed to comply with Chapter 16 of the *International Building Code* where any of the following conditions occur:

1. The occupant load of the tent or membrane structure exceeds 100,
2. The tent or membrane structure is classified as a Group A, E, or I,
3. The tent or membrane structure is classified as a Group R Occupancy with an occupant load exceeding 50, or
4. The tent or membrane structure exceeds one story.

3103.9.2 Documentation. Documentation of structural stability shall be furnished to the fire code official upon request.

Reason: There has been confusion with attempting to apply the IFC requirements in Chapter 31 to temporary tents and membrane structures relative to structural stability.

These structures can be seen at concerts, outdoor functions, fairs, etc. Even though the provision of 'temporary' limits the usability of these structures to less than 180 days, improper structural design can still lead to problems.

Many of these temporary tents and temporary membrane structures have multiple floors, and over 30 feet in height. As the height increases, the impact of collapse increases and typically these structures are surrounded by hundreds of people.

This proposal revises IFC Section 3103.9 to include requirements for temporary tents and membrane structures to comply with IBC Chapter 16 structural requirements when there is a significant life hazard within the structure, as reflected in Section 3103.9.1. The relative significance is based on the occupancy classification, the occupant load, or the number of levels within the tent or membrane structure.

The requirement for documentation is relocated from 3103.9 to 3103.9.2.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Cost Impact: This code change may increase the cost of construction

3103.9-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the proposal has merit but needs to contain separate requirements for tents and for membrane structures due to their different characteristics. A concern was also expressed that Section 3103.9.1(2) could be applied to very small tents that could not comply with all the requirements.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

3103.9 Anchorage required. Tents or membrane structures and their appurtenances shall be adequately roped, braced and anchored to withstand the elements of weather and prevent against collapsing. Documentation of structural stability shall be furnished to the fire code official on request.

3103.9.1 Tents and membrane structures exceeding one story. Tents and membrane structures exceeding one story shall be designed and constructed to comply with Chapter 16 of the *International Building Code.*

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Members of the IFC committee and others at the Dallas hearings thought the original proposal that required tents and membrane structures to comply with IBC structural design requirements was not justified for all of the structures described in the proposal. We cannot disagree with those opinions.

However, there are an ever increasing number of multiple story tents and membrane structures showing up in jurisdictions. These structures can be seen at concerts, outdoor functions, fairs, etc. Even though the provision of 'temporary' limits the usability of these multistory structures to less than 180 days, improper structural design can pose a significant safety hazard.

The code currently requires that documentation of structural stability be furnished to the fire code official on request, but provides no guidance on how to determine an acceptable level of structural integrity.

This proposal closes this loophole by requiring multiple story tents and membrane structures to be designed and constructed in accordance with Chapter 16 of the IBC. This provides the fire code official with a solid tool to use to verify proper structural design.

F268-13

Final Action: AS AM AMPC____ D

F278-13
3304.2, 3304.3 (New), 3304.4

Proposed Change as Submitted

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

~~**3304.2 Waste disposal.** Combustible debris shall not be accumulated within buildings. Combustible debris, rubbish and waste material shall be removed from buildings at the end of each shift of work. Combustible debris, rubbish and waste material shall not be disposed of by burning on the site unless *approved*.~~

3304.2 Combustible debris, rubbish and waste. Combustible debris, rubbish and waste material shall comply with the requirements of Sections 3304.2.1 through 3304.2.4.

3304.2.1 Combustible debris, rubbish and waste material shall not be accumulated within buildings.

3304.2.2 Combustible debris, rubbish and waste material shall be removed from buildings at the end of each shift of work.

3304.2.3 Rubbish containers. Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material, until the end of each shift of work. The rubbish containers shall be constructed entirely of materials that comply with any one of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

3304.2.4 Spontaneous ignition. Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a *listed* disposal container.

3304.3 Burning of combustible debris, rubbish and waste. Combustible debris, rubbish and waste material shall not be disposed of by burning on the site unless *approved*.

~~**3304.3**~~ **3304.4 Open burning.** *Open burning* shall comply with Section 307.

~~**3304.4 Spontaneous ignition.** Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a *listed* disposal container.~~

Reason: This section needs to be rewritten in a more logical fashion because 3304.2 needs to address what to do with combustible debris, rubbish and waste but not address prohibitions or ***what not to do***, which should be covered in another section (burning of the rubbish). The use of the phrase “combustible debris, rubbish and waste material” makes this section consistent with other sections of the IFC.

When dealing with what needs to be done, the proper sequence is: (a) don’t accumulate it, (b) remove it at the end of a work shift and (c) (which is missing) put it in appropriate rubbish containers while you are working. Section 3304.4 addresses a special rubbish container for materials susceptible to pontaneous ignition and should also be covered under 3304.2 and not in a separate section.

With regard to burning of combustible waste, this should have its own section, preceding the section on open burning, and should not be covered under what to do with rubbish.

The added requirement for the rubbish containers (other than those for spontaneous ignition materials) tells inspectors that rubbish containers should be provided for temporary storage of combustible rubbish (until the end of the shift of work). Such containers should be constructed of materials that have been shown to be safe by meeting a very severe fire test, just like those required by section 808 for I1, I2 and I3 occupancies. A key requirement is that the lids be tight fitting or self-closing.

Cost Impact: Minimal.

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The disapproval was based on the fact that Section 3304.2.3 doesn't include a container size as do other sections of the code and because Section 3304.2.2 is unclear as to why a container would need to be emptied if it were not full and if it would need to be emptied if it became full before the end of a work shift.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, (GBH International), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

3304.2.3 Rubbish containers. Where rubbish containers with a capacity exceeding 5.33 cubic feet (40 gallons) (0.15 m^3) are used ~~Containers with tight-fitting or self-closing lids shall be provided~~ for temporary storage of combustible debris, rubbish and waste material, ~~until the end of each shift of work~~ they shall have tight fitting or self closing lids. Such ~~The~~ rubbish containers shall be constructed entirely of materials that comply with one of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: The technical committee did not disagree with the requirement but was concerned about the lack of a minimum size limit. The minimum size limit added is consistent with the size requirements in section 304.3 of the IFC. The fire safety requirements are consistent with those for large rubbish containers throughout the IFC. At present there are no fire safety requirements for rubbish containers in this application and that is the only IFC section lacking such requirements.

The technical committee was also concerned about the requirement to empty containers at the end of each shift of work and it has been eliminated.

The proposal adds clarity to this section by reorganizing it in a more logical fashion.

F278-13

Final Action: AS AM AMPC____ D

F279-13
3304.2.1 (New)

Proposed Change as Submitted

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

3304.2.1 Rubbish containers. Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material, until the end of each shift of work. The rubbish containers shall be constructed entirely of materials that comply with either of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

Reason: Rubbish containers should be provided for temporary storage of combustible rubbish (until the end of the shift of work). Such containers need not be constructed of metal but can be constructed of other noncombustible materials, including materials that have been shown to be safe by meeting a very severe fire test, just like those required by section 808 for I1, I2 and I3 occupancies. A key requirement is that the lids be tight fitting or self closing. Note that this does not address materials susceptible to spontaneous ignition, such as oily rags, covered by 3304.4. The use of the phrase "combustible debris, rubbish and waste" makes this section consistent with other sections of the IFC.

Cost Impact: Minimal

3304.2.1 (NEW)-F-HIRSCHLER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the fact that the proposal doesn't include a container size.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, (GBH International), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

3304.2.1 Rubbish containers. Where rubbish containers with a capacity exceeding 5.33 cubic feet (40 gallons) (0.15 m^3) are used ~~Containers with tight-fitting or self-closing lids shall be provided~~ for temporary storage of combustible debris, rubbish and waste material~~, until the end of each shift of work~~ they shall have tight fitting or self closing lids. ~~The~~ Such rubbish containers shall be constructed entirely of materials that comply with either of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

Commenter's Reason: The technical committee did not disagree with the requirement but was concerned about the lack of a minimum size limit. The minimum size limit added is consistent with the size requirements in section 304.3 of the IFC. The fire safety requirements are consistent with those for large rubbish containers throughout the IFC. At present there are no fire safety requirements for rubbish containers in this application and that is the only IFC section lacking such requirements,

F279-13

Final Action: AS AM AMPC____ D

F285-13
5001.1, 5004.2.2, 5004.3, 5701.2

Proposed Change as Submitted

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Revise as follows:

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.
This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1 through 9 *(No change to current text)*
~~10. The storage of distilled spirits and wines in wooden barrels and casks.~~
11. *(No change to current text)*

5004.2.2 Secondary containment for hazardous material liquids and solids. Where required by Table 5004.2.2 buildings, rooms or areas used for the storage of hazardous materials liquids or solids shall be provided with secondary containment in accordance with this section when the capacity of an individual vessel or the aggregate capacity of multiple vessels exceeds the following:

1. Liquids: Capacity of an individual vessel exceeds 55 gallons (208 L) or the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L); and
2. Solids: Capacity of an individual vessel exceeds 550 pounds (250 kg) or the aggregate capacity of multiple vessels exceeds 10,000 pounds (4540 kg).

Exception: The release of a liquid or solid without secondary containment into a sanitary or storm-water drainage system or onto the ground is allowed when in compliance with federal, state, or local governmental agencies' regulations and permits.

5004.3 Ventilation. Indoor storage areas and storage buildings shall be provided with mechanical exhaust ventilation or natural ventilation where natural ventilation can be shown to be acceptable for the materials stored.

~~Exception~~ Exceptions:

1. Storage areas for flammable solids complying with Chapter 59.
2. Storage areas for distilled spirits in wooden barrels or casks.

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1 through 9 *(No change to current text)*
10. The storage of distilled spirits ~~and wines~~ in wooden barrels and casks.
11 The storage of fermented beverages with ethyl alcohol contents of 16% or less.

Reason: There is confusion about the applicability of flammable liquid (Chapter 57) hazardous materials (Chapter 50) provisions to distilled spirits because of the exceptions for distilled spirits and wines stored in wooden barrels and casks in IFC Chapters 50 and

57 (and NFPA 30). The issue arises because of the growing popularity of "boutique" or "craft" distillers locating their operations in urban areas. The proposed language clarifies bulk storage provisions for distilled spirits but does not alter the intent. The proposed language does not affect provisions applicable to use, nor those applicable to liquor storage in retail or wholesale establishments. First, note distilled spirits are Class 1C and Class 1B flammable liquids. They are primarily comprised of ethyl alcohol (ethanol) and water with concentrations ranging from approximately 19% to 99%. The boiling point of pure ethanol is approximately 178ºF so an ethanol mixture with water will boil between 178ºF and 212ºF. The closed cup flash point for a 19% concentration of ethanol in water is 100ºF and for a 58% concentration is 73ºF making the mixtures in this range Class 1C flammable liquids (these values are not adjusted for altitude). Ethanol concentrations in water between 58% and 99% are Class 1B flammable liquids.

Second, the Building Code establishes occupancy. If a quantity of a Class 1B or Class 1C flammable liquid exceeding the maximum allowable quantity (MAQ), the room in which it is located is an H3 Occupancy. Please remember this applies to bulk storage (casks, barrels, metal containers, etc. exceeding 1.3 gallon capacities) and not to liquor stores and wholesale distributors for which there are several exceptions.

Third, H occupancies have to be sprinklered. This is the primary provision overlooked because of the confusion noted above. This is not because wood is inherently safer than metal, plastic or glass – it is not. It was probably inserted in the legacy code(s) back when casks were stored in liquid storage warehouses separated by hundreds of feet from one another and urban distilleries weren't contemplated. It was probably held over today because there is not yet an established sprinkler criteria for the storage of Class 1C flammable liquids in wooden barrels and casks. THIS HOWEVER DOES NOT MEAN THESE ROOMS SHOULD BE EXEMPT FROM SPRINKLERING REQUIREMENTS! An engineered sprinkler design is required.

Fourth, the applicable code requirements have not been changed. The UBC legacy code excepted distilled spirits stored in wooden barrels and casks from the secondary containment and ventilation requirements normally mandated for flammable liquids. The exception was often misinterpreted even then to extend to the entire range of code provisions. When flammable liquids requirements were brought into the IFC, the exception was moved to the scoping provisions which created the confusion recurring today. The deletion of the exception in Section 5001.1 removes the confusion associated with the applicable requirements. The modifications to Sections 5004.2.2 and 5004.3 reestablish the exceptions to secondary containment and ventilation contained in the legacy code.

The Nonapplicability of Chapter 57 to distilled spirits is retained. The word "wines" is removed from the exception for two reasons:

a) if the intent to read "distilled wines" then distilled spirits already includes this; and
b) if the intent is to read "wines and distilled spirits" then wines is included in new item 11 (along with beer).

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

5001.1-F-EMERICK

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The disapproval was based on the lack of technical justification for the proposed exception to Section 5004.2.2, the provisions of which appear to already be covered in current Section 5004.2.3. Also, current Section 5701.2, Exception 8 appears to cover the proposed change to that section.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brad Emerick, Denver Fire Department, representing Fire Marshal's Association of Colorado (FMAC), requests Approval as Submitted.

Commenter's Reason: The proposed language clarifies bulk storage provisions for distilled spirits but does not alter the intent. The proposed language does not affect provisions applicable to use or those applicable to liquor storage in retail or wholesale establishments.

Occupancy is established in the IBC and H occupancies have to be sprinklered. This is the primary provision overlooked because of the exceptions for distilled spirits stored in wooden barrels and casks.

When flammable liquids requirements were brought into the IFC, the exceptions were moved to the scoping provisions which created the confusion recurring today.

The deletion of the exception in Section 5001.1 removes the confusion associated with the applicable requirements.

The modifications to Sections 5004.2.2 and 5004.3 reestablish the exceptions to secondary containment and ventilation.

The Nonapplicability of Chapter 57 to distilled spirits is retained.

The word “wines” is removed from the exception for two reasons:

a) if the intent to read “distilled wines” then distilled spirits already includes this; and
b) if the intent is to read “wines and distilled spirits” then wines is included in new item 11 (along with beer).

F285-13
Final Action: AS AM AMPC____ D

F295-13
5003.9, 5003.9.11 (New)

<u>Proposed Change as Submitted</u>

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov)

Revise as follows:

5003.9 General safety precautions. General precautions for the safe storage, handling or care of hazardous materials shall be in accordance with Sections 5003.9.1 through ~~5003.9.10~~ <u>5003.9.11</u>.

<u>**5003.9.11 Emergency showers and eyewash stations.** In Group I-2 Condition 2, where the eyes or body of any person are at risk for exposure to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. The emergency showers and eyewash stations shall be installed in accordance with the *International Plumbing Code*.</u>

Reason: This proposal addresses KTag K134. The IPC already provides the installation requirements but the requirements are not called up in the IFC. This proposal uses verbiage from OSHA with some minor revisions to remove permissive language. The focus is only on corrosive materials which are defined in the IFC. The scope of this change is limited to Group I-2 condition 2 due to the scoping limitations of the Ad Hoc Healthcare Committee.

Source of verbiage (no copyright issues):

OSHA
1910.151(c)
Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

For Reference:

International Plumbing Code 2012

SECTION 411
EMERGENCY SHOWERS AND EYEWASH STATIONS

411.1 Approval. Emergency showers and eyewash stations shall conform to ISEA Z358.1.

411.2 Waste connection. Waste connections shall not be required for emergency showers and eyewash stations.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx

Cost impact:

5003.9-F-WILLIAMS-ADHOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the language of the proposal is vague and ambiguous and could lead to inconsistent enforcement. The committee also felt that including OSHA-type worker safety requirements in the code is inconsistent with the scope of the code and could lead to conflicts with OSHA regulations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

5003.9 General safety precautions. General precautions for the safe storage, handling or care of hazardous materials shall be in accordance with Sections 5003.9.1 through 5003.9.11.

5003.9.11 Emergency showers and eyewash stations. In Group I-2 Condition 2, where the eyes or body of ~~any~~ a person ~~are~~ is at risk for exposure to ~~injurious~~ corrosive materials, ~~suitable facilities for quick drenching or flushing of the eyes and body~~ emergency showers or eyewash stations shall be provided within the work area for immediate emergency use. The emergency showers and eyewash stations shall be installed in accordance with the *International Plumbing Code*.

Commenter's Reason: How to install these systems is already in the IPC. The IFC does address hazards, so this trigger should be in the IFC. The modification is striking language that could be considered subjective.

F295-13

Final Action: AS AM AMPC____ D

F300-13
5203.7 (New), 5204.1

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS) (rjd@davidsoncodeconcepts.com)

Revise as follows:

5203.7 Sources of ignition. Sources of ignition shall comply with Sections 5203.7.1 through 5203.7.2.

5003.7.1 Smoking. Smoking shall be prohibited and “No Smoking” signs provided as follows:

1. In rooms or areas where materials are stored or dispensed or used in open systems .
2. Within 25 feet (7620 mm) of outdoor storage or open use areas.
3. Facilities or areas within facilities that have been designated as totally “no smoking” shall have “No Smoking” signs placed at all entrances to the facility or area. Designated areas within such facilities where smoking is permitted either permanently or temporarily, shall be identified with signs designating that smoking is permitted in these areas only.

Signs required by this section shall be in English as a primary language or in symbols allowed by this code and shall comply with Section 310.

5203.7.2 Open flames. Open flames and high-temperature devices shall not be used in a manner which creates a hazardous condition and shall be listed for use with the materials stored or used.

5204.1 General. Loose combustible fibers, not in suitable bales or packages and ~~whether housed or~~ stored outdoors in the open, shall ~~not be stored within 100 feet (30 480 mm) any structure, except as indicated in this chapter~~ comply with Section 2808 of this code. Occupancies involving the indoor storage of loose combustible fibers in amounts exceeding the maximum allowable quantity per control area as set forth in Section 5003.1 shall comply with Sections 5204.2 through 5204.6.

Reason: This proposal is part of a package of proposals concerning Chapter 52 Combustible Fibers. An issue identified in review of the current code language and structure is that though Chapter 52 Combustible Fibers is located in the "Hazardous Materials" portion of the code, combustibles fibers are not defined as a hazardous material.

> ***5001.2 Material classification.*** *Hazardous materials are those chemicals or substances defined as such in this code. Definitions of hazardous materials shall apply to all hazardous materials, including those materials regulated elsewhere in this code.*
>
> ***5001.2.1 Mixtures.*** *Mixtures shall be classified in accordance with hazards of the mixture as a whole. Mixtures of hazardous materials shall be classified in accordance with nationally recognized reference standards; by an approved qualified organization, individual, or Material Safety Data Sheet (MSDS); or by other approved methods.*
>
> ***5001.2.2 Hazard categories.*** *Hazardous materials shall be classified according to hazard categories. The categories include materials regulated by this chapter and materials regulated elsewhere in this code.*
>
> ***5001.2.2.1 Physical hazards.*** *The material categories listed in this section are classified as physical hazards. A material with a primary classification as a physical hazard can also pose a health hazard.*
>
> 1. *Explosives and blasting agents.*
> 2. *Combustible liquids.*
> 3. *Flammable solids, liquids and gases.*
> 4. *Organic peroxide solids or liquids.*
> 5. *Oxidizer, solids or liquids.*
> 6. *Oxidizing gases.*
> 7. *Pyrophoric solids, liquids or gases.*
> 8. *Unstable (reactive) solids, liquids or gases.*
> 9. *Water-reactive materials solids or liquids.*
> 10. *Cryogenic fluids.*

5001.2.2.2 Health hazards. *The material categories listed in this section are classified as health hazards. A material with a primary classification as a health hazard can also pose a physical hazard.*

1. *Highly toxic and toxic materials.*
2. *Corrosive materials.*

Combustible fibers do not fit into those parameters. A review of the definition of hazardous materials found within the code also documents that the materials regulated by Chapter 52 are not hazardous materials.

[F] HAZARDOUS MATERIALS. *Those chemicals or substances that are physical hazards or health hazards as classified in Section 307 and the International Fire Code, whether the materials are in usable or waste condition.*

[F] HEALTH HAZARD. *A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are toxic or highly toxic, and corrosive.*

[F] PHYSICAL HAZARD. *A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid), oxidizer (solid or liquid), oxidizing gas, pyrophoric (solid, liquid or gas), unstable (reactive) material (solid, liquid or gas) or water- reactive material (solid or liquid).*

Since the scoping of Chapter 50, including the sections within Chapter 50, are for the regulation of hazardous materials, even basic requirements found within Chapter 50 such as control of ignition hazards would not apply to the activities regulated by Chapter 52.

CHAPTER 50
HAZARDOUS MATERIALS—GENERAL PROVISIONS

SECTION 5001
GENERAL

5001.1 Scope. *Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling* ***of*** *hazardous materials shall be in accordance with this chapter.*

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

SECTION 5003
GENERAL REQUIREMENTS

5003.1 Scope. *The storage, use and handling* ***of all hazardous materials*** *shall be in accordance with this section.*

This proposal addresses this issue by adding a Section 5203.7 "Sources of ignition" by extracting requirements from current Section 5003.7 "Sources of ignition" that would be appropriate for combustible fibers. In reality, there isn't any other section of Chapter 50 that provides for the regulation of combustible fibers.

In addition, this proposal is building upon a separate proposal to recognize the ability to control the hazards of combustible fibers just as the code provides for recognition of the control of combustible dust by modifying the language found in Section 5204.1.

Section 5204.1 is proposed to be modified to point to Section 2808 "STORAGE AND PROCESSING OF WOOD CHIPS, HOGGED MATERIAL, FINES, COMPOST AND RAW PRODUCT ASSOCIATED WITH YARD WASTE AND RECYCLING FACILITIES" of the fire code as the appropriate standard for the exterior storage of combustible fibers. The materials and hazards presented are similar.

Section 5204.1 is further modified to indicate that the more restrictive indoor storage of combustible fibers regulated by Sections 5204.2 through 5204.6 is for those facilities that have amounts exceeding the maximum allowable quantity per control area as set forth in Section 5003.1. If the hazards are controlled eliminating the application of IFC Table 5003.1.1/IBC [F]307.1.1(1) and Sections 307.4 and 307.5 of the IBC, the increased protection levels are not necessary.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers.

Fire codes related to storage, handling, and preprocessing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and preprocessing technologies, the BFICOCS has identified changes in the IFC that benefit industry and the public.

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

5203.7 (NEW)-F-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent's reason statement that the code change provides a needed improvement to the provisions applicable to combustible fibers.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob Eugene, representing UL LLC, requests Approval as Modified by Public Comment.

Modify the proposal as follows:

5203.7.2 Open flames. Open flames and high-temperature devices shall not be used in a manner which creates a hazardous condition<u>. High temperature devices and those devices utilizing an open flame</u> ~~and~~ shall be listed for use with the materials stored or used.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: As written the proposal would require open flames to be listed. This public comment clarifies that it is the devices utilizing the open flames that must be listed.

F300-13

Final Action: AS AM AMPC____ D

F310-13
5307 (New), 908.7 (New), 105.6.4 (New), Table 105.6.8

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

SECTION 5307
CARBON DIOXIDE (CO_2) SYSTEMS USED IN BEVERAGE DISPENSING APPLICATIONS

5307.1 General. Carbon dioxide systems with 100 or more pounds of carbon dioxide used in beverage dispensing applications shall comply with Sections 5307.2 through 5307.5.2.

5307.2 Permits. Permits shall be required as set forth in Section 105.6.

5307.3 Equipment. The storage, use, and handling of liquid carbon dioxide shall be in accordance with Chapter 53 and the applicable requirements of NFPA 55, Chapter 13.

5307.4 Protection from damage. Carbon dioxide systems shall be installed so the storage tanks, cylinders, piping and fittings are protected from damage by occupants or equipment during normal facility operations.

5307.5 Required protection. Where carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing carbon dioxide storage tanks, cylinders, piping and fittings and other areas where a leak of carbon dioxide can collect shall be provided with either ventilation in accordance with Section 5307.5.1 or an emergency alarm system in accordance with Section 5307.5.2.

5307.5.1 Ventilation. Mechanical ventilation shall be in accordance with the *International Mechanical Code* and shall comply with all of the following:

1. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cubic foot per minute per square foot [0.00508 $m^3/(s \bullet m^2)$].
2. Exhaust shall be taken from a point within 12 inches (305 mm) of the floor.
3. The ventilation system shall be designed to operate at a negative pressure in relation to the surrounding area.

5307.5.2 Emergency alarm system. An emergency alarm system shall comply with all of the following:

1. Continuous gas detection shall be provided to monitor areas where carbon dioxide can accumulate.
2. The threshold for activation of an alarm shall not exceed 5,000 parts per million (9,000 mg/m^3).
3. Activation of the emergency alarm system shall initiate a local alarm at an approved location.

908.7 Carbon dioxide (CO_2) systems. Emergency alarm systems in accordance with Section 5307.5.2 shall be provided where required for compliance with Section 5307.5.

105.6.4 Carbon dioxide systems used in beverage dispensing applications. An operational permit is required for carbon dioxide systems used in beverage dispensing applications with more than 100 pounds of carbon dioxide.

(Renumber subsequent sections.)

Revise as follows:

TABLE 105.6.8
PERMIT AMOUNTS FOR COMPRESSED GASES

TYPE OF GAS	AMOUNT (cubic feet at NTP)
Inert and simple asphyxiant [a]	6,000

(Portions of table not shown remain unchanged)

For SI: 1 cubic foot = 0.02832 m^3.

a. For carbon dioxide used in beverage dispensing applications, see Section 105.6.4.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This proposal is intended to address fatal CO_2 poisoning incidents in restaurants where CO_2 leaked from large storage tanks and displaced oxygen in these areas. Two such incidents can be found at:

http://articles.orlandosentinel.com/2005-02-12/news/0502120303_1_carbon-dioxide-central-florida-sanford

http://savannahnow.com/news/2011-09-14/carbon-dioxide-blamed-pooler-mcdonalds-death

Individual requirements are proposed based on the following:

105.6.4 and Table 105.6.8 – Operational permits are required for CO_2 systems used in the beverage dispensing applications covered by new Section 5307.

5307.1 – The intent of the proposal is to address locations where CO_2 is used in conjunction with carbonators to produce carbonated beverages. A minimum trigger of 100 lbs. was selected for these requirements because it was felt that systems with lesser amounts of CO_2 do not pose as great a risk of asphyxiation as is present with large quantities of the gas.

5307.2 – Provides a reference to permit requirements that is consistent with other such references in the code.

5307.3 - Components in a compressed gas system are already required to comply with Chapter 53 which will cover items such as pressure vessel and piping requirements, among others. An additional reference to NFPA 55, Chapter 13 brings in additional requirements that relate specifically to these installations.

5307.4 - This section includes basic requirements that are intended to protect CO_2 storage tanks, cylinders, piping and fittings are protected from damage by occupants or equipment during normal facility operations. This will decrease the chance of damage that may cause leaks, which is especially important in the facilities in which gas detection systems are not provided.

5307.5 – This section requires buildings in which the CO_2 systems are installed to be provided with either ventilation that complies with Section 5307.5.1 or an emergency alarm system that complies with Section 5307.5.2. It does not require that both ventilation and gas detection be required.

The hazard associated with these systems is that the heavier than air CO_2 may accumulate and displace oxygen, creating an asphyxiation hazard. Leaks are most likely from fittings and connections, but could also be from plastic or other runs of piping.

5307.5.2 – When the emergency alarm system option is selected, it shall include a continuous gas detection system with CO_2 detectors of adequate number and spacing to cover the protected area. The trigger level of 5000 ppm CO_2 is the OSHA Permissible Exposure Limit (PEL).

Cost Impact: This proposal will add to the cost of construction.

5307 (NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

5307.1 General. Carbon dioxide systems with more than 100 ~~or more~~ pounds of carbon dioxide used in beverage dispensing applications shall comply with Sections 5307.2 through 5307.5.2.

5307.3 Equipment. The storage, use, and handling of liquid carbon dioxide shall be in accordance with Chapter 53 and the applicable requirements of NFPA 55, Chapter 13. Insulated liquid carbon dioxide systems shall have pressure relief devices vented in accordance with NFPA 55.

5307.5.2 Emergency alarm system. An emergency alarm system shall comply with all of the following:

1. Continuous gas detection shall be provided to monitor areas where carbon dioxide can accumulate.
2. The threshold for activation of an alarm shall not exceed 5,000 parts per million (9,000 mg/m^3).
3. Activation of the emergency alarm system shall initiate a local alarm within the room or area in which the system is installed ~~at an approved location~~.

(Portions of the proposal not shown remain unchanged.)

Committee Reason: The committee agreed with the proponent that the code change focuses on an emerging life safety hazard for building occupants and first responders and, while it will need some adjustments, it should be put into the code now to provide important safeguards against accidental CO_2 asphyxiation. The modification to Section 5307.1 provides correlation with the permit requirements of Section 105.6.4. The modification to Section 5307.3 provides needed overpressure protection for insulated systems. The modification to Section 5307.5.2 better defines where an alarm must sound and provides correlation with CGA-6.5 which, although not referenced in the IFC, is a national standard on the subject.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Christopher B. Cantrell, Nebraska Boiler Inspection Program Manager (i.e. Chief Boiler Inspector), NDOL, representing State of Nebraska; Tony Oda, Chief Boiler Inspector, representing State of Washington; Gary L. Scribner, Deputy Chief, representing Missouri Division of Fire Safety; Robby D. Troutt, Texas Department of Licensing and Regulation State of Texas, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

5307.5 Required protection. Where insulated liquid carbon dioxide storage tanks are located indoors or in enclosed areas an emergency alarm system shall be provided in accordance with Section 5307.5.2. Where carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing carbon dioxide storage tanks, cylinders, piping and fittings and other areas where a leak of carbon dioxide can collect shall be provided with either ventilation in accordance with Section 5307.5.1 or an emergency alarm system in accordance with Section 5307.5.2.

5307.5.2 Emergency alarm system. An emergency alarm system shall comply with all of the following:

1. Continuous gas detection shall be provided to monitor areas where carbon dioxide can accumulate.
2. The threshold for activation of a Low Level alarm shall not exceed 5,000 parts per million (9,000 mg/m3). The threshold for activation of a High Level alarm shall not exceed 30,000 parts per million (27,000 mg/m3).
3. Activation of the emergency alarm system shall initiate a local alarm within the room or area in which the system is installed.
4. Warning signs shall be posted at the entrance to the building, room, enclosure, or enclosed area where storage containers are located.
5. Additional instructional signage shall be posted outside of the area where storage containers are located and such signage shall contain at minimum the following information.
   5.1 Low Level Alarm (5,000ppm) – Provide appropriate cross ventilation to the area. Personnel are allowed to enter the area for a period of time not to exceed 15 minutes in order to identify and repair potential leaks.
   5.2 High Level Alarm (30,000ppm) – Personnel shall evacuate the area and no personnel shall enter the affected area without proper self-contained breathing apparatus until the area is adequately ventilated and the concentration of CO_2 is reduced below the high alarm limit.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: Paragraph 5307.5 allows either alarms or ventilation. This is in conflict with the requirements of NFPA 55 chapter 13 for insulated liquid carbon dioxide storage tanks that are filled on site (adopted by reference in paragraph 5307.3), and it is in conflict with the installation requirements found in the 2013 Edition of the National Board Inspection Code, Part 1 Supplement 3 (ANSI/NB23). The above change would eliminate these conflicting statements and add consistency across the Codes.

Paragraph 5307.5.2 requires a local alarm in areas where carbon dioxide may accumulate but does not address signage. CO2 monitoring systems have different stages of alarms. With carbon dioxide systems being installed in almost every fast food restaurant and convenience store, locations that normally have high turnover and employ younger workers it is imperative to give clear direction to avoid misunderstanding, direction and undue panic. The proposed wording is also consistent with the requirements of the 2013 Edition of the National Board Inspection Code, Part 1, Supplement 3 (ANSI/NB23). These changes not only provide consistency between the codes, but they will provide clear guidance to workers and first responders in locations where carbon dioxide systems are installed.

Public Comment 2:

Barry Greive, representing Target Corporation, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

SECTION 5307
CARBON DIOXIDE (CO_2) SYSTEMS USED IN BEVERAGE DISPENSING APPLICATIONS

5307.1 General. Carbon dioxide systems with 100 or more pounds of carbon dioxide used in beverage dispensing applications shall comply with Sections 5307.2 through 5307.5.2.

Exceptions:

1. (CO_2) tanks with 100 pounds of carbon dioxide that are open to spaces 5,000 to 10,000 square feet or greater.
2. (CO_2) tanks ≤ 300 pounds of carbon dioxide that are open to spaces greater than 10,000 to 20,000 square feet or greater.
3. (CO_2) tanks ≤ 500 pounds that are open to spaces greater than 20,000 to 50,000 square feet.
4. (CO_2) tanks over 500 pounds that are open to spaces greater than 50,000 square feet.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: There are many situations where the Carbon Dioxide tank is open to a much larger area and the levels of (CO_2) would not reach a hazardous level because of the sheer volume of air in the space. If the tanks are located in a small room or enclosed space then there is a justifiable need for additional safeguards. These system are widely used and throughout the food and beverage industry and are becoming more prevalent all the time.

The proposed exceptions are very conservative in nature for your average building and using methodology used for refrigeration system detection and alarming. The numbers were derived using a safe amount of 5.7 pounds of carbon dioxide per 1000 cubic feet.

F310-13

Final Action: AS AM AMPC____ D

F325-13
6003.1.4.1

Proposed Change as Submitted

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

Revise as follows:

6003.1.4.1 Floors. In addition to the requirements set forth in Section 5004.12, floors of storage areas <u>where highly toxic and toxic liquids are stored</u> shall be of liquid-tight construction.

Reason: Liquid tight flooring for storage of highly toxic and toxic solids is illogical. We believe the code section was intended for storage of liquids only.

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

6003.1.4.1-F-KLAUSBRUCKNER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that removal of the requirement for solids could create a hazard condition where firefighting water application would create a liquid mixture that should be contained.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Elley Klausbruckner, representing Klausbruckner & Associates Inc., requests Approval as Submitted.

Commenter's Reason: The code section has nothing to do with containment. This code change does not eliminate containment at all. It simply proposes that the requirements of liquid tight flooring does not apply to toxic or highly toxic <u>solids</u>.

Additionally the argument that toxic or highly toxic solids should be stored in rooms having liquid tight flooring because of the firefighting water application is illogical. Using the same argument warehouses containing many commonly used plastics should be also liquid tight since during pyrolysis many of the plastics can be considered as toxic which then creates the same situation if firefighting water is applied.

F325-13
Final Action: AS AM AMPC____ D

F327-13
Table 6104.3

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

TABLE 6104.3
LOCATION OF LP-GAS CONTAINERS

LP-GAS CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS~~, PUBLIC WAYS~~ OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS [b, c] (feet)
	Mounded or underground LP-gas containers [a] (feet)	Above-ground LP-gas containers [b] (feet)	

(Portions of table not shown remain unchanged)

Reason: The definition in the International Fire Code of "public way" is:
"A street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet."

The Commentary to the IFC elaborates by saying:
"The Public way marks the termination of the exit discharge portion of the means of egress system. It is the final destination for occupants, and is presumed to be safe from the emergency occurring in the structure or that it will directly connect to other routes so that occupants can move a distance away from the danger."

Based on the history of the term "public way," the chief concern is being able to egress the occupants of a building in a manner that allows them to have access to a safe space outside the building. The presumption is that an emergency has occurred inside the building and the occupants must egress the building safely.

The restriction on the placement of a propane container with respect to a public way is not consistent with the purpose for establishing a public way because the threat to the occupants does not come from the propane container. The container is required to be located a specific distance from the building based on its size and therefore, the container will not be threatened by a fire event that occurs within the building. It has been shown that the distances required by Table 6104.3 are sufficient to maintain the safety of the container even if the building is on fire. Therefore, there is no threat to the occupants from the propane container as they egress the building. In addition, the potential concern of vehicular impact to the propane container is already addressed in Section 312 of the IFC.

Chapter 61 refers to NFPA 58 as a standard that "fills in the gaps" that may not be addressed in Chapter 61. In this case, NFPA 58 has a restriction (Table 6.5.3) on the location of product transfers with respect to public ways and places of public assembly. Transfers of propane into or out of the container are prohibited within 10 feet of a public way and within 50 feet of outdoor places of public assembly. Therefore, the threat to the general public during product transfer operations is addressed by NFPA 58.

The limitation in the IFC on the placement of containers with respect to public ways creates a conflict between Section 6104.3 with Table 6104.3 in the IFC and Section 6.3.1 with Table 6.3.1 in NFPA 58. This conflict has led to differing interpretations by various authorities having jurisdiction and we propose to delete the term "public ways" to resolve the conflict.

In summary, elimination of the term "public way" will not compromise the safety of the occupants of the building and will resolve a conflict between the IFC and NFPA 58.

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

6104.3-F-SWIECICKI

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the public way, where owned by a municipality, could be used for any purpose and could even be sold for private development which would place the propane tank too close to the new private property line.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Approval as Submitted.

Commenter's Reason: The Committee Reason Statement is not solid justification for disapproving this code change because it does not recognize that a propane container can be moved to another location very easily.

The definition in the International Fire Code of "public way" is: "A street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet." The Commentary to the IFC elaborates by saying: *"The Public way marks the termination of the exit discharge portion of the means of egress system. It is the final destination for occupants, and is presumed to be safe from the emergency occurring in the structure or that it will directly connect to other routes so that occupants can move a distance away from the danger."*

Based on the history of the term "public way," the chief concern is being able to egress the occupants of a building in a manner that allows them to have access to a safe space outside the building. The presumption is that an emergency has occurred inside the building and the occupants must egress the building safely.

The restriction on the placement of a propane container with respect to a public way is not consistent with the purpose for establishing a public way because the threat to the occupants does not come from the propane container. The container is required to be located a specific distance from the building based on its size and therefore, the container will not be threatened by a fire event that occurs within the building. It has been shown that the distances required by Table 6104.3 are sufficient to maintain the safety of the container even if the building is on fire. Therefore, there is no threat to the occupants from the propane container as they egress the building. In addition, the potential concern of vehicular impact to the propane container is already addressed in Section 312 of the IFC.

Chapter 61 refers to NFPA 58 as a standard that "fills in the gaps" that may not be addressed in Chapter 61. In this case, NFPA 58 has a restriction (Table 6.5.3) on the location of product transfers with respect to public ways and places of public assembly. Transfers of propane into or out of the container are prohibited within 10 feet of a public way and within 50 feet of outdoor places of public assembly. Therefore, the threat to the general public during product transfer operations is addressed by NFPA 58.

The limitation in the IFC on the placement of containers with respect to public ways creates a conflict between Section 6104.3 with Table 6104.3 in the IFC and Section 6.3.1 with Table 6.3.1 in NFPA 58. This conflict has led to differing interpretations by various authorities having jurisdiction and we propose to delete the term "public ways" to resolve the conflict.

In summary, elimination of the term "public way" will not compromise the safety of the occupants of the building and will resolve a conflict between the IFC and NFPA 58.

F327-13

Final Action: AS AM AMPC____ D

F328-13
Table 6104.3

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

TABLE 6104.3
LOCATION OF LP-GAS CONTAINERS

LP-GAS CONTAINER CAPACITY (water gallons)	**MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON**		**MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS [b, c] (feet)**
	Mounded or underground LP-gas containers [a] (feet)	**Above-ground LP-gas containers [b] (feet)**	
Less than 125[c, d]	10	5 e	None
501 to 2,000	10	25 ~~e~~, f	3

(Portions of table not shown remain unchanged)

a through d *(No changes to current text)*

e. The following shall apply to above-ground containers installed alongside buildings:

1. LP-gas containers of less than a 125-gallon water capacity are allowed next to the building they serve when in compliance with Items 2, 3 and 4.
2. LP-gas containers of less than a 125-gallon water capacity are allowed next to a lot line of adjoining property.

~~2~~3. Department of Transportation (DOTn) specification LP-gas containers shall be located and installed so that the discharge from the container pressure relief device is at least 3 feet horizontally from building openings below the level of such discharge and shall not be beneath buildings unless the space is well ventilated to the outside and is not enclosed for more than 50 percent of its perimeter. The discharge from LP-gas container pressure relief devices shall be located not less than 5 feet from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances or mechanical ventilation air intakes.

~~3~~4. ASME LP-gas containers of less than a 125-gallon water capacity shall be located and installed such that the discharge from pressure relief devices shall not terminate in or beneath buildings and shall be located at least 5 feet horizontally from building openings below the level of such discharge and not less than 5 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances, or mechanical ventilation air intakes.

~~4~~5. The filling connection and the vent from liquid-level gauges on either DOTn or ASME LP-gas containers filled at the point of installation shall not be less than 10 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances or mechanical ventilation air intakes.

f. *(No change to current text)*

Reason: This proposal will bring the IFC into closer correlation with NFPA 58 regarding the installation of small containers next to buildings. There is no technical basis for permitting the installation of a small container next to a building and still mandating a separation distance from a lot line, as Note e to Table 6104.3 may currently be interpreted to require. ICC staff previously responded to a request for interpretation and agrees that an installation in which a small container is located next to a building does not constitute a violation if the property line is within 5 feet of the container.

The other change would strike the reference to Note e in the cell for 501-2000 gallon above-ground containers. Since Note e is only applicable to containers less than 125 gallons, there is no need to reference it in that cell.

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

6104.3T #1-F-SWIECICKI

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's concern that property lines can change through zoning changes or lot consolidations. It also appears that the revision to Note e.1 would contain two separate exceptions that should be shown as separate sub-notes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Approval as Submitted.

Commenter's Reason: In rebuttal to the Committee Statement, propane containers, especially those less than 125 gallons, are easily relocated.

This proposal will bring the IFC into closer correlation with NFPA 58 regarding the installation of small containers next to buildings. There is no technical basis for permitting the installation of a small container next to a building and still mandating a separation distance from a lot line, as Note e to Table 6104.3 may currently be interpreted to require.

F328-13

Final Action: AS AM AMPC____ D

F332-13
6110.1, 6110.2

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

6110.1 ~~Temporarily out of service~~ Containers disconnected from service at consumer sites. LP-gas containers disconnected from service ~~whose use has been temporarily discontinued~~ at consumer sites shall comply with all of the following:

~~1. Be disconnected from appliance piping.~~
~~2~~1. ~~Have~~ The LP-gas container outlets, except pressure relief valves, shall be closed ~~or~~ and plugged or capped.
~~3~~2. ~~Be~~ The container shall be positioned with the pressure relief valve in direct communication with the LP-gas container vapor space.

6110.2 ~~Permanently out of service~~ Retrieval of disconnected containers. ~~LP-gas containers to be placed permanently out of service shall be removed from the site.~~ LP-gas containers that have been disconnected from service shall be retrieved by the owner.

Reason: As currently worded, the text in Section 6110 is confusing and difficult to implement. A reading of the 2012 Commentary indicates that the concern is over LP-gas containers that have been disconnected from service due to a customer's request, usually because the customer wants to switch suppliers. The text proposed above will clarify in concise terms what needs to be done in order to avoid the release of gas from a container that has been disconnected from service. The proposal accomplishes the following:

- The changed titles clarify the intent of these sections.
- The deletion of current #1 occurs because the first sentence of the paragraph establishes that the container has already been disconnected from the piping system.
- Changing "outlets" to "appurtenances" is more accurate since not every valve on a container is an "outlet." Container appurtenances are defined in NFPA 58 as "devices installed in container openings for safety, control or operating purposes."
- It is necessary not only to close the valve, but also to plug or cap it.

Current 6110.2 was reworded slightly to establish the responsibility lies with the container owner by recognizing that although the majority of propane tanks are owned by the propane marketer, some are owned by the property owner and therefore the marketer has no control over them.

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

6101.1-**F-SWIECICKI**

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's concern that the code change would allow disconnected containers to be left on the site for an indeterminate length of time, thereby increasing the hazard to firefighters. Section 6110.2 does not deal with all options of ownership of the container.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

6110.1 ~~Temporarily~~ Containers out of service LP-gas containers ~~whose use has been temporarily discontinued~~ disconnected from service at consumer sites shall comply with all of the following:

1. Be disconnected from appliance piping.
2. ~~Have~~ The LP-gas container ~~outlets~~ valves and openings, except pressure relief valves, shall be closed ~~or~~ and plugged or capped.
3. ~~Be~~ The container shall be positioned with the pressure relief valve in direct communication with the ~~LP-gas container~~ vapor space of the container.

6110.2 ~~Permanently out of service~~ Retrieval of containers. LP-gas containers ~~to be placed permanently out of~~ disconnected from service shall be removed from the site.

Commenter's Reason: This proposal will "clean up" the language in 6110.1 and also incorporates the important safety provision of requiring valves to be not only closed, but also plugged and capped when the container is disconnected from service.

The title of Section 6110.2 can lead to confusion so we are proposing an alternative. Also, since a container that is disconnected from service is not necessarily "permanently out of service," the modification will clarify that this requirement is related to 6110.1.

F332-13

Final Action: AS AM AMPC____ D

F333-13
6111.2, 6111.2.1, 6111.2.2

Proposed Change as Submitted

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

6111.2 Unattended parking. The unattended parking of LP-Gas cargo tank vehicles not in service shall be in accordance with ~~Sections 6111.2.1 and 6111.2.2~~ one of the following:

1. Vehicles shall be parked within a LP-Gas Bulk Plant.
2. Vehicles shall be parked off of public streets, highways, public avenues or public alleys.
3. Vehicles shall be parked at other *approved* locations not less than 50 feet (15. 240 m) from buildings, other than those *approved* for the storage or servicing of such vehicles.

~~**6111.2.1 Near residential, educational and institutional occupancies and other high-risk areas.** LP-gas tank vehicles shall not be left unattended at any time on residential streets or within 500 feet (152 m) of a residential area, apartment or hotel complex, educational facility, hospital or care facility. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the *fire code official*, pose an extreme life hazard.~~

~~**6111.2.2 Durations exceeding 1 hour.** LP-gas tank vehicles parked at any one point for longer than 1 hour shall be located as follows:~~

1. ~~Off public streets, highways, public avenues or public alleys.~~
2. ~~Inside of a bulk plant.~~
3. ~~At other *approved* locations not less than 50 feet (15 240 mm) from buildings other than those *approved* for the storage or servicing of such vehicles.~~

Reason: LP-gas tank vehicles are more commonly referred to as “cargo tank vehicles” and they are under the jurisdiction of the U.S. Department of Transportation, Title 49 of the Code of Federal Regulations. The transportation of hazardous materials (propane is classified as a flammable gas, Division 2.1) is regulated by the Hazardous Materials Regulations (Parts 171-185) and the Federal Motor Carrier Safety Regulations (Parts 350-399).

The current text in 6111.2 addresses “unattended” parking, in which the operator of the vehicle is not present and able to react to an emergency situation by either driving the vehicle or controlling the flow of product into or out of the cargo tank. A vehicle that is parked for the purpose of transferring product into or out of the cargo tank would not be considered to be “unattended” because paragraph 177.834 (i) requires the operator to be in attendance during the product transfer operation. Therefore, the requirements in 6111.2 would not be applicable whenever the cargo tank vehicle was being loaded or unloaded.

The requirements in 6111.2.1 address unattended parking with respect to certain occupancies and other locations that are termed “high-risk” areas. This paragraph is not needed in the code because it imposes requirements that are unwarranted and contradictory as compliance with 6111.2.1 and 6111.2.2 is muddled, i.e., it is not uncommon for LP-gas bulk plants to be located within 500 feet of the occupancies and locations that are mentioned in 6111.2.1. Therefore, the parking of cargo tank vehicles *even within the confines of the bulk plant could constitute a violation.*

Furthermore, the requirements from 49 CFR Part 397.7(b) makes no mention of the occupancies or locations described in 6111.2.1:

> *§ 397.7Parking*
> *(b) A motor vehicle which contains hazardous materials other than Division 1.1, 1.2, or 1.3 materials must not be parked on or within five feet of the traveled portion of public street or highway except for brief periods when the necessities of operation require the vehicle to be parked and make it impracticable to park the vehicle in any other place.*

The requirements in current paragraph 6111.2.2 are reasonable and do not impose an undue burden on operators of LP-gas cargo tank vehicles. Those requirements are more consistent (but not identical) with those in paragraph 9.7.2 of NFPA 58. Therefore, this wording is retained in 6111.2.

The 50-foot separation distance has been shown to be a valid separation distance to protect the cargo tank from exposure to nearby fires. The 50-foot separation is required for stationary containers greater than 2,000 gallons water capacity and has been justified by numerical modeling of steel containers exposed to fire. The research paper, (*Journal of Hazardous Materials*, April 2006) analyzed steel propane containers of the sizes referred to in Table 6104.3 that were exposed to a severe petroleum pool fire

100 feet in diameter. The modeling indicated that the temperatures of the container walls were well below the temperature at which steel begins to yield. Since all LPG cargo tank motor vehicles are less than 30,000 gallons water capacity, the fifty foot separation distance is justified.

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

6111.2-F-SWIECICKI

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's concern over the lack of technical documentation on why the distance should be changed from 500 feet all the way down to 50 feet.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bruce Swiecicki, National Propane Gas Association, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

6111.2 Unattended parking. The unattended parking of LP-Gas cargo tank vehicles not in service shall be in ~~accordance with~~ a LP-Gas bulk plant or the parking location shall comply with one of the following:

~~1. Vehicles shall be parked within a LP-Gas Bulk Plant.~~
~~2~~1. Vehicles shall be parked off of public streets, highways, public avenues or public alleys.
~~3~~2. Vehicles shall be parked at other approved locations not less than 50 feet (15. 240 m) from buildings, other than those *approved* for the storage or servicing of such vehicles.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: LP-gas tank vehicles are more commonly referred to as "cargo tank vehicles" and they are under the jurisdiction of the U.S. Department of Transportation, Title 49 of the Code of Federal Regulations. The transportation of hazardous materials (propane is classified as a flammable gas, Division 2.1) is regulated by the Hazardous Materials Regulations (Parts 171-185) and the Federal Motor Carrier Safety Regulations (Parts 350-399).

The current text in 6111.2 addresses "unattended" parking, in which the operator of the vehicle is not present and able to react to an emergency situation by either driving the vehicle or controlling the flow of product into or out of the cargo tank. A vehicle that is parked for the purpose of transferring product into or out of the cargo tank would not be considered to be "unattended" because paragraph 177.834 (i) requires the operator to be in attendance during the product transfer operation. Therefore, the requirements in 6111.2 would not be applicable whenever the cargo tank vehicle was being loaded or unloaded.

The requirements in 6111.2.1 address unattended parking with respect to certain occupancies and other locations that are termed "high-risk" areas. This paragraph is not needed in the code because it imposes requirements that are unwarranted and contradictory as compliance with 6111.2.1 and 6111.2.2 is muddled, i.e., it is not uncommon for LP-gas bulk plants to be located within 500 feet of the occupancies and locations that are mentioned in 6111.2.1. Therefore, the parking of cargo tank vehicles *even within the confines of the bulk plant could constitute a violation.*

Furthermore, the requirements from 49 CFR Part 397.7(b) makes no mention of the occupancies or locations described in 6111.2.1:

> *§ 397.7Parking*
> *(b) A motor vehicle which contains hazardous materials other than Division 1.1, 1.2, or 1.3 materials must not be parked on or within five feet of the traveled portion of public street or highway except for brief periods when the necessities of operation require the vehicle to be parked and make it impracticable to park the vehicle in any other place.*

The requirements in current paragraph 6111.2.2 are reasonable and do not impose an undue burden on operators of LP-gas cargo tank vehicles. Those requirements are more consistent (but not identical) with those in paragraph 9.7.2 of NFPA 58. Therefore, this wording is retained in 6111.2.

The 50-foot separation distance has been shown to be a valid separation distance to protect the cargo tank from exposure to nearby fires. The 50-foot separation is required for stationary containers greater than 2,000 gallons water capacity and has been justified by numerical modeling of steel containers exposed to fire. The research paper, (*Journal of Hazardous Materials*, April 2006) analyzed steel propane containers of the sizes referred to in Table 6104.3 that were exposed to a severe petroleum pool fire 100 feet in diameter. The modeling indicated that the temperatures of the container walls were well below the temperature at which steel begins to yield. Since all LPG cargo tank motor vehicles are less than 30,000 gallons water capacity, the fifty foot separation distance is justified.

F333-13

Final Action: AS AM AMPC____ D

F340-13

Appendix B105.1, Table B105(1) (New), B105.2, Table B105(2) (New), Table B105.1

Proposed Change as Submitted

Proponent: Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

B105.1 One- and two-family dwellings, congregate living facilities of Groups R-3 and R-4 and townhouses,. The minimum fire-flow and flow duration requirements for one- and two-family *dwellings*, congregate living facilities of Group R-3 and R-4 and townhouses ~~having a fire-flow calculation area that does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min) for 1 hour. Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5m^2) shall not be less than that specified in Table B105.1.~~ shall be as specified in Tables B105(1) and B105(3).

> ~~**Exception:** A reduction in required fire-flow of 50 percent, as approved, is allowed when the building is equipped with an approved automatic sprinkler system.~~

TABLE B105(1)
REQUIRED FIRE-FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, CONGREGRATE LIVING FACILITIES OF GROUP R-3 AND R-4 AND TOWNHOUSES,

FIRE-FLOW CALCLUATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
0-3,600	No automatic sprinkler system	1,000	1
3,601-greater	No automatic sprinkler system	Value in Table B105(3)	Duration in Table B105(3) at the required fire-flow rate
0-3,600	Section 903.3.1.3 of the *International Fire Code*. or Section P2904 of the *International Residential Code*	500	0.5
3,601-greater	Section 903.3.1.3 of the *International Fire Code*. or Section P2904 of the *International Residential Code*	½ value in Table B105(3)	1

B105.2 Buildings other than one- and two-family dwellings, congregate living facilities of Group R-3 and R-4 and Townhouses. The minimum fire-flow and flow duration for buildings other than one- and two-family *dwellings,* congregate living facilities of Group R-3 and R-4 and Townhouses shall be as specified in Tables ~~B105.1~~ B105(2) and B105(3).

> ~~**Exception:** A reduction in required fire-flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.~~

TABLE B105(2)
REQUIRED FIRE-FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, CONGREGRATE LIVING FACILITIES OF GROUP R-3 AND R-4 AND TOWNHOUSES,

AUTOMATIC SPRINKLER SYSTEM(Design Standard)	**MINIMUM FIRE-FLOW (gallons per minute)**	**FLOW DURATION (hours)**
No automatic sprinkler system	Value in Table B105.3	Duration in Table B105(3)
Section 903.3.1.1 of the *International Fire Code*.	25% of the value in Table B105(3)[a]	Duration in Table B105(3) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*.	25% of the value in Table B105(3)[b]	Duration in Table B105(3) at the reduced flow rate

a. The reduced fire-flow shall not be less than 1,000 gallons per minute (5678 L/min)
b. The reduced fire-flow shall not be less than 1,500 gallons per minute (3785 L/min)

B105.3 Water supply for buildings equipped with an automatic sprinkler system. For buildings equipped with an approved *automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The automatic *sprinkler system demand*, including hose stream allowance.
2. The required fire-flow.

TABLE ~~B105.1~~ B105(3)
~~MINIMUN REQUIRED FIRE FLOW AND FLOW DURATION FOR BUILDINGS~~
REFERENCE TABLE FOR TABLES B105(1) AND B102(2)

(Portions of table not shown remain unchanged)

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

1. Clarifies that "Townhouses" R-3 and R-4 congregate living facilities are to be treated as one-and-two family dwellings with respect to developing needed fire flow in accordance with appendix B.
2. Relocates the fire flow modifiers from the paragraph to a table format in B105(1) and B105(2) for easier readability and application by the user.
3. Recognizes the provisions of P2904 in the IRC as equivalent to NFPA 13D when determining needed fire flow.
4. Provides a reduction in the required duration of fire flow for fully sprinklered one-and two-family dwellings less than 3,600 square feet as a reasonable incentive for the installation of a fire sprinkler system. Experience with fire sprinklers shows that a vast majority of fires in one and two family dwellings will be controlled or extinguished by the fire sprinkler system. This duration modifier also provides an achievable fire flow in rural applications where the development of a 1 hour duration is unrealistic.
5. Provides reduction to 1,000 GPM, rather than 1,500 GPM, for buildings other than one-and two-family dwellings and townhomes protected in accordance with NFPA 13 sprinkler systems. Currently, the appendix treats both NFPA 13R and NFPA 13 systems similarly permitting a reduction in fire flow to 1,500 GPM. An NFPA 13 system provides a significantly greater level of protection via the system design area, water supply and protection of concealed combustible spaces. Due to this level of protection, there should be a reduced minimum fire flow for buildings protected in accordance with NFPA 13 systems as opposed to NFPA 13R systems.
6. The current language provides no guidance to the Fire Chief as to criteria upon which to base approval of the required fire flow reduction for sprinkler protected buildings. The change simply allows the reduction by the elimination of the exceptions and codifying the credits in the tables.
7. This code change proposal clarifies in B105.3 that a fire sprinkler demand should not be added to the manual fire flow demand in developing the needed fire flow. The greater of the sprinkler demand or the demand developed in accordance with Appendix B will be the required fire flow.
8. IFC Section 903.3.1.3 was revised last cycle to include Group R-3 and R-4 congregate residences as well as townhouses. Fair Housing by law requires group homes to be considered the same as single family.

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

B105.1-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The approval was based on the committee's judgment that the proposal recognizes the progress in the development of sprinkler technology and the corresponding reduction in required fire flows.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

B105.1 One- and two-family dwellings, ~~congregate living facilities of~~ Groups R-3 and R-4 and townhouses. The minimum fire-flow and flow duration requirements for one- and two-family *dwellings*, ~~congregate living facilities of~~ Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.1(1) and B105.1(2)~~(3)~~.

TABLE B105.1(1)
REQUIRED FIRE-FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, ~~CONGREGRATE LIVING FACILITIES OF~~ GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES,

FIRE-FLOW CALCLUATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
0-3,600	No automatic sprinkler system	1,000	1
3,601-greater	No automatic sprinkler system	Value in Table B105.1(2)~~(3)~~	Duration in Table B105.1(2)~~(3)~~ at the required fire-flow rate
0-3,600	Section 903.3.1.3 of the *International Fire Code*. or Section P2904 of the *International Residential Code*	500	0.5
3,601-greater	Section 903.3.1.3 of the *International Fire Code*. or Section P2904 of the *International Residential Code*	½ value in Table B105.1(2)~~(3)~~	1

TABLE B105.1(2)~~(3)~~
REFERENCE TABLE FOR TABLES B105.1(1) AND ~~B102(2)~~B105.2
(Portions of table not shown remain unchanged)

B105.2 Buildings other than one- and two-family dwellings, ~~congregate living facilities of~~ Group R-3 and R-4 buildings and townhouses. The minimum fire-flow and flow duration for buildings other than one- and two-family *dwellings,* ~~congregate living facilities of~~ Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.2~~(2)~~ and B105.1(2)~~(3)~~.

TABLE B105.2~~(2)~~
REQUIRED FIRE-FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, ~~CONGREGRATE LIVING FACILITIES OF~~ GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES,

AUTOMATIC SPRINKLER SYSTEM(Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table ~~B105.3~~ B105.2(2)	Duration in Table B105.1(2)~~(3)~~
Section 903.3.1.1 of the *International Fire Code*.	25% of the value in Table B105.1(2)~~(3)~~[a]	Duration in Table B105.1(2)~~(3)~~ at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*.	25% of the value in Table B105.1(2)~~(3)~~[b]	Duration in Table B105.1(2)~~(3)~~ at the reduced flow rate

a. The reduced fire-flow shall not be less than 1,000 gallons per minute (5678 L/min)
b. The reduced fire-flow shall not be less than 1,500 gallons per minute (3785 L/min)

B105.3 Water supply for buildings equipped with an automatic sprinkler system. For buildings equipped with an approved *automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The automatic *sprinkler system demand*, including hose stream allowance.
2. The required fire-flow.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Group R-3 may resemble townhouses or one- or two- story dwellings. The current text does not address those types of Group R-3. Group R-4 are always congregate residences. Therefore, removing the term "congregate living facilities of" would allow for all Group R-3 and R-4 buildings to use this sprinkler option.

The changes to the table references are editorial for the correct numbering of tables in accordance standard code language.

F340-13
Final Action: AS AM AMPC____ D

F341-13
Appendix D106.3 (New)

Proposed Change as Submitted

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

Add new text as follows:

D106.3 Remoteness. Where two fire apparatus access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses.

Reason: Currently, Section D106, Multiple-Family Residential Developments, does not require fire apparatus access roads to be remote when more than one access road is required. D104, Commercial and Industrial Developments, and D107, One- or Two-Family Residential Developments already contain a "remoteness" provision.

This code change proposal duplicates the language from D104.3 into a new 106.3 placing new "Remoteness" language within the Section D106 that is directly relevant to Multiple-Family Residential Developments.

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

D106.3-F-APFELBECK

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the code change based on the proponent's reason statement and that the proposal provides long needed guidance for multi-family structures.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Shapiro, P.E., International Code Consultants, representing National Multi Housing Council, requests Disapproval.

Commenter's Reason: The foundation of this proposal is paralleling the requirements for developments with one- and two-family dwellings and developments with multifamily dwellings. Simple duplication is not appropriate in this case because developments with one- and two-family dwellings may or may not include fire sprinklers in all of the buildings. In contrast, all new multi-family developments only include buildings that have fire sprinklers and minimum requirements for fire resistance apply.

No justification was offered by the original proposal to substantiate the change other than correlation, and because the situations dealt with by these two parts of the code are different, simply duplicating the text from one place to the other is not appropriate. At a minimum, some reduction in any separation requirement that may be proposed should be considered given the different levels of fire protection provided for homes vs. multifamily occupancies.

F341-13
Final Action: AS AM AMPC____ D

F345-13
Appendix K (New)

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Add new text as follows:

Appendix K
Employee Qualifications

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION K101
FIRE INSPECTOR
AND FIRE PLAN EXAMINER QUALIFICATIONS

K101.1. Fire inspector and fire plan examiner. The *fire code official* shall appoint or hire such number of officers, fire inspectors, fire plan examiners, assistants and other employees as shall be authorized by the jurisdiction. A person shall not be appointed or hired as a fire inspector or fire plans examiner who has less than five years' experience as a contractor, engineer, architect, a member of the fire service, or a member of a fire prevention organization. Any combination of education and experience that would confer equivalent knowledge and ability shall be deemed to satisfy this requirement. Fire inspectors and fire plan examiners shall be certified through a recognized certification program for such position.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "NIST Charleston Sofa Store Fire Recommendations". The scope of the activity is noted as:

> Review the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 3 of the NIST report reads as follows:

> **"Qualified Fire Inspectors and Building Plan Examiners:** NIST recommends that all state and local jurisdictions ensure that fire inspectors and building plan examiners are professionally qualified to a national standard such as NFPA 1031 Standard for Professional Qualifications for Fire Inspector and Plan Examiner. Professional qualification may be demonstrated through a nationally accepted certification examination, such as the Fire Plan Examiner; Fire Inspector I and II, and Certified Fire Marshal."

Following a review of recommendation 3 of the NIST report a new Appendix K is proposed. This proposal is similar in scope and intent to Section A101.3 of Appendix A of the International Building Code where suggested qualifications for building official, chief inspector, inspector and plan examiner are established.

The purpose of this proposal is to provide optional criteria for qualifications of employees who enforce the Fire Code through inspections and plan examinations. A jurisdiction that wants to make this appendix a mandatory part of the code would need to specifically list this appendix in its adoption ordinance. In recognition of the fact that some jurisdictions are mandated by applicable state law to employ only persons licensed by the state to perform certain duties, the proposal was drafted as an Appendix.

This proposal would not require fire inspectors or fire plan examiners to have had previous experience in Fire Code enforcement, but would merely require that they possess experience in a related job category. It is not our intent to prohibit a plan review and inspection staff from hiring and training entry level employees. The training of entry level shall be supervised by trained and certified personnel.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

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

APPENDIX K (NEW)-F-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The disapproval was based on the committee's judgment that the proposal has merit but is far from ready for the code, even if in an appendix. Suggested improvements included inclusion of entry-level personnel in the text (they were mentioned in the reason statement), provisions for continuing education need to be added and separate qualifications should be established for inspectors and plans examiners. Concern was also expressed that the proposed appendix could restrict a fire chief's options on how they administer their department by establishing employee qualification time frames that may conflict with state laws on the subject.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chairman, ICC Code Technology Committee (cbaldassarra@rjagroup.com) and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Appendix K
Employee Qualifications

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION K101
FIRE INSPECTOR
AND FIRE PLAN EXAMINER QUALIFICATIONS

K101.1. Fire inspector and fire plan examiner. ~~The *fire code official* shall appoint or hire such number of officers, fire inspectors, fire plan examiners, assistants and other employees as shall be authorized by the jurisdiction~~. A person shall not be appointed ~~or hired~~ as a fire inspector or fire plans examiner who has less than five years' experience as a contractor, engineer, architect, a member of the fire service, or a member of a fire prevention organization. Any combination of education and experience that would confer equivalent knowledge and ability shall be deemed to satisfy this requirement. Fire inspectors and fire plan examiners shall be certified through a recognized certification program for such positions.

Exceptions:

1. Fire inspectors under direct supervision of a fire inspector who meets the qualifications of this section.
2. Plan reviewers under direct supervision of a plan reviewer who meets the qualifications of this section.

Commenter's Reason: This is a joint public comment submitted on behalf of the ICC Code Technology Committee (CTC) and the ICC Fire Code Action Committee (FCAC).

The exceptions address the issues raised by the code development committee. This will allow for a jurisdiction to appoint a person who does not yet have the full experience and certification as long as there is a supervision or training program while this person gains the appropriate knowledge. It is the committee's intent that direct supervision means oversight of and assuming the responsibility for inspection or plan review work.

Continuing education requirements will be set by the certification entity. If the time frame would conflict with state requirements, the jurisdiction can modify the requirements.

F345-13

Final Action: AS AM AMPC____ D

F349-13
3203.4

Proposed Change as Submitted

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (dmeyers@ieccode.com)

Revise as follows:

3203.4 Class III commodities. Class III commodities are commodities of wood, paper, natural fiber cloth, or Group C plastics or products thereof, with or without pallets. Products are allowed to contain limited amounts of Group A or B plastics, such as metal bicycles with plastic handles, pedals, seats and tires. Group A plastics shall be limited in accordance with Section 3203.7.4. Examples of Class III commodities include, but are not limited to, the following:

Aerosol, Level 1 (see Chapter 28)
<u>Biomass briquettes, bagged, totes and static piles</u>
<u>Biomass pellets, bagged, totes and static piles</u>
<u>Charcoal</u>
Combustible fiberboard
Cork, baled
<u>Corn cobs, static piles</u>
<u>Corn stover, baled and chopped</u>
Feed, bagged
Fertilizers, bagged
<u>Firewood</u>
Food in plastic containers
<u>Forest residue, round wood or chipped (branches, bark, cross-cut ends, edgings and treetops)</u>
Furniture: wood, natural fiber, upholstered, non-plastic, wood or metal with plastic-padded and covered armrests
Glycol in combustible containers not exceeding 25 percent
Lubricating or hydraulic fluid in metal cans
Lumber
Mattresses, excluding foam rubber and foam plastics
Noncombustible liquids in plastic containers having a capacity of more than 5 gallons (19 L)
Paints, oil base, in metal cans
Paper, waste, baled
Paper and pulp, horizontal storage, or vertical storage that is banded or protected with *approved* wrap
Paper in cardboard boxes
<u>Peanut hulls, bagged, totes and static piles</u>
Pillows, excluding foam rubber and foam plastics
Plastic-coated paper food containers
Plywood
Rags, baled
<u>Recovered construction wood</u>
<u>Rice hulls, bagged, totes and static piles</u>
Rugs, without foam backing
<u>Seasonal grasses, baled and chopped</u>
<u>Straw, baled</u>
Sugar, bagged
Wood, baled
<u>Wood chips, bagged, totes and static piles</u>

Woody biomass, round wood or chipped (vase-shaped stubby bushes, bamboo, willows; branches, bark and stem wood)
Wood doors, frames and cabinets
Wood pellets, bagged, totes and static piles
Yarns of natural fiber and viscose

Reason: The additions clarify that certain "crop-residue" as solid, biomass feedstock as biofuel are appropriately identified as Class III commodities.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers (ASABE).

Fire codes related to storage, handling, and pre-processing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and pre-processing technologies, the BFICOCS has identified changes in the IFC that benefit both industry and the public.

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

3203.4-F-MEYERS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved as there is no specific fire data presented that was associated with storing these materials in a high-piled storage configuration.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards, requests Approval as Modified by this Public Comment.

Modify this proposal as follows:

3203.4 Class III commodities. Class III commodities are commodities of wood, paper, natural fiber cloth, or Group C plastics or products thereof, with or without pallets. Products are allowed to contain limited amounts of Group A or B plastics, such as metal bicycles with plastic handles, pedals, seats and tires. Group A plastics shall be limited in accordance with Section 3203.7.4. Examples of Class III commodities include, but are not limited to, the following:

Aerosol, Level 1 (see Chapter 28)
Biomass briquettes, bagged, ~~totes~~ and static piles
Biomass pellets, bagged, ~~totes~~ and static piles
Charcoal
Combustible fiberboard
Cork, baled
Corn cobs, static piles
Corn stover, baled and chopped

Feed, bagged
Fertilizers, bagged
Firewood
Food in plastic containers
Forest residue, round wood or chipped (branches, bark, cross-cut ends, edgings and treetops)
Furniture: wood, natural fiber, upholstered, non-plastic, wood or metal with plastic-padded and covered armrests
Glycol in combustible containers not exceeding 25 percent
Lubricating or hydraulic fluid in metal cans
Lumber
Mattresses, excluding foam rubber and foam plastics
Noncombustible liquids in plastic containers having a capacity of more than 5 gallons (19 L)
Paints, oil base, in metal cans
Paper, waste, baled
Paper and pulp, horizontal storage, or vertical storage that is banded or protected with *approved* wrap
Paper in cardboard boxes
Peanut hulls, bagged, ~~totes~~ and static piles
Pillows, excluding foam rubber and foam plastics
Plastic-coated paper food containers
Plywood
Rags, baled
Recovered construction wood
Rice hulls, bagged, ~~totes~~ and static piles
Rugs, without foam backing
Seasonal grasses, baled and chopped
Straw, baled
Sugar, bagged
Wood, baled
Wood chips, bagged, ~~totes~~ and static piles
Woody biomass, round wood or chipped (vase-shaped stubby bushes, bamboo, willows; branches, bark and stem wood)
Wood doors, frames and cabinets
Wood pellets, bagged, ~~totes~~ and static piles
Yarns of natural fiber and viscose

Commenter's Reason: The additions submitted to both the 2015 IFC and the 2015 revision cycle to NFPA 13-2006 via NFPA's Technical Committee on *Sprinkler System Discharge Criteria*, clarify that certain "crop-residue" as solid, biomass feedstock as biofuel are appropriately identified as Class III commodities. At the Public Hearings in Dallas, the IFC Committee requested specific fire data associated with these solid, biomass materials:

The tabulated data below was prepared by the Idaho National Laboratory (INL) Biological and Chemical Processing Group, to provide both the IFC Membership and the NFPA13 TC with: 1) Results for heat of combustion performed at INL using the standard test methods of ASTM D5865-10a, *Standard Test Method for Gross Calorific Value of Coal and Coke Using Either an Isoperibol or Adiabatic Bomb Calorimeter* and 2) Results that INL has drawn from n US and European literature based on values in the Phyllis database, the US DOE/EERE feedstock database, and selected literature sources, showing values for a range of cellulosic, solid biomass material.

This comparative and peer-reviewed literature demonstrates that the Higher Heating Values (HHVs) for the proposed set of biomass feedstock are less than those for the two grades of Coal (Bituminous and Sub-Bituminous), Charcoal, and Wood [Douglas fir wood and Douglas fir bark (i.e., Furniture)] required for the comparative classification of Class III Commodities in Section 3203.4 of the IFC and Table A.5.6.3.3 for Class III Commodities in the forthcoming 2016 Edition of NFPA 13.

Comparative Material	**HHV (GJ Mg-1)**	**HHV (Btu/lb)**
Bituminous Coal	31.7	13,629
Sub-Bituminous Coal	32.9	14,144
Charcoal[1]	31.0	13,328
Douglas fir	21.0	9,028

Biomass Material [2]	**HHV (GJ Mg-1)**	**HHV (Btu/lb)**
Beech	20.3	8,727
Corn Cobs	17.8	7,652
(Pellets)	*17.1*	*7,364*

Corn stalks/stover	19.2	8,250
Hulls/Shells, Ag. Residue	20.5	8,838
Eucalyptus grandis	19.4	8,340
Miscanthus	19.7	8,499
(Pellets)	*16.2*	*6,964*
Poplar	20.7	8,899
Rice hulls	15.3	6,578
Rice straw	15.8	6,793
Sugar cane bagasse	17.3	7,438
Sorghum	19.4	8,353
(Pellets)	*16.0*	*6,857*
Switchgrass	19.2	8,237
(Pellets)	*18.0*	*7,747*
Wheat straw	17.5	7,524
Wood chips (max.)	20.8	8,946

NOTE 1: "Charcoal – Bagged, Standard" already exists as a Class III Commodity as classified by NFPA 13-2013 [Section No. A.5.6.3.3]

NOTE 2: As can be seen upon reviewing the tabulated data, not one of the Biomass Materials exceeds the HHV for Comparative Class III Materials.

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F349-13

Final Action: AS AM AMPC____ D

F350-13
2801.1, 2802.1, 2804.1, 2808.1, 2808.2, 2809.1, 2809.2, 202

Proposed Change as Submitted

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (dmeyers@ieccode.com)

Revise as follows:

CHAPTER 28
LUMBER YARDS, AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES

SECTION 2801
GENERAL

2801.1 Scope. The storage, manufacturing and processing of solid biomass feedstock, timber, lumber, plywood, veneers and agro-industrial byproducts shall be in accordance with this chapter.

SECTION 2802
DEFINITIONS

2802.1 Definitions. The following terms are defined in Chapter 2:

AGRO-INDUSTRIAL.
BIOMASS.
STATIC PILES.
SOLID BIOFUEL.
SOLID BIOMASS FEEDSTOCK.

SECTION 2804
FIRE PROTECTION

2804.1 General. Fire protection in timber and lumber production mills, ~~and~~ plywood and veneer mills, and agro-industrial facilities shall comply with Sections 2804.2 through 2804.4.

SECTION 2808
STORAGE AND PROCESSING OF WOOD CHIPS, HOGGED MATERIAL, FINES, COMPOST, SOLID BIOMASS FEEDSTOCK, AND RAW PRODUCT ASSOCIATED WITH YARD WASTE, AGRO-INDUSTRIAL AND RECYCLING FACILITIES

2808.1 General. The storage and processing of wood chips, hogged materials, fines, compost, solid biomass feedstock and raw product produced from yard waste, debris, agro-industrial and recycling facilities shall comply with Sections 2808.2 through 2808.10.

2808.2 Storage site. Storage sites shall be level and on solid ground, elevated soil lifts or other all-weather surface. Sites shall be thoroughly cleaned before transferring wood products to the site.

SECTION 2809
EXTERIOR STORAGE OF FINISHED LUMBER AND SOLID BIOFUEL PRODUCTS

2809.1 General. Exterior storage of finished lumber and solid biofuel products shall comply with Sections 2809.1 through 2809.5.

2809.2 Size of piles. Exterior ~~lumber~~ storage shall be arranged to form stable piles with a maximum height of 20 feet (6096 mm). Piles shall not exceed 150,000 cubic feet (4248 m^3) in volume.

2809.3 Fire apparatus access roads. Fire apparatus access roads in accordance with Section 503 shall be located so that a maximum grid system unit of 50 feet by 150 feet (15 240 mm by 45 720 mm) is established.

2809.4 Security. Permanent ~~lumber~~ storage areas shall be surrounded with an *approved* fence. Fences shall be a minimum of 6 feet (1829 mm) in height.

Exceptions:

1. Lumber piles inside of buildings and production mills for lumber, plywood and veneer.
2. Solid biofuel piles inside of buildings and agro-industrial processing facilities for solid biomass feedstock.

2809.5 Fire protection. An *approved* hydrant and hose system or portable fire-extinguishing equipment suitable for the fire hazard involved shall be provided for open storage yards. Hydrant and hose systems shall be installed in accordance with NFPA 24. Portable fire extinguishers complying with Section 906 shall be located so that the travel distance to the nearest unit does not exceed 75 feet (22 860 mm).

SECTION 202
GENERAL DEFINITIONS

AGRO-INDUSTRIAL. Technologies, methods and associated machinery used in transforming raw agricultural products into intermediate or consumable products.

BIOMASS. Plant or animal-based material of biological origin, including but not limited to materials originating from arboriculture, agriculture, aquaculture, horticulture and forestry, excluding material embedded in geological formations or transformed into fossil.

STATIC PILES. Piles in which processed wood product or solid, biomass feedstock is mounded and is not being turned or moved.

SOLID BIOFUEL. Densified biomass made with or without additives in the form of cubiform, polyhedral, polyhydric or cylindrical units, produced by compressing milled biomass.

SOLID BIOMASS FEEDSTOCK. The basic materials, including agricultural residues, including but not limited to corn cobs, corn stover, rice hulls, and peanut hulls; herbaceous crops, including but not limited to warm- and cool-seasonal grasses; forest residue, including but not limited to branches, bark, cross-cut ends, edgings and treetops; short-rotation woody crops, including but not limited to vase-shaped stubby bushes, bamboo, willows with five to ten-year rotations and their branches, bark and stem wood; agricultural waste, including but not limited to garden or park waste, grass or flower cuttings and hedge trimmings; and dried manure; from which biofuel is comprised, manufactured or made.

Reason: The proposed language facilitates fire control and reduces exposures to and from facilities storing and processing “crop-residue” as solid biomass feedstock for biofuel production.

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Fire codes related to storage, handling, and pre-processing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and pre-processing technologies, the BFICOCS has identified changes in the IFC that benefit both industry and the public.

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

2801.1-F-MEYERS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the proposal has merit in recognizing emerging biofuel technology but needs additional work to be ready for the code. Issues with the proposal mentioned included the cumbersomeness of the SOLID BIOMASS FEEDSTOCK definition and its use of complicated, difficult to understand terms; that the proposal should take into account the seasonal increases in the volume of materials that will be stored yielding much larger piles; that the proposal should include provisions for indoor storage of these materials which appears to be a trend in portions of the country and that more guidance is needed on what types of fire protection systems would be appropriate for larger piles.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 202
GENERAL DEFINITIONS

AGRO-INDUSTRIAL. ~~Technologies, methods and associated machinery used in~~A facility, or portion thereof, housing operations involving the transforming raw agricultural products into intermediate or consumable products.

BIOMASS. Plant or animal-based material of biological origin, ~~including but not limited to materials originating from arboriculture, agriculture, aquaculture, horticulture and forestry,~~ excluding material embedded in geological formations or transformed into fossil.

STATIC PILES. Piles in which processed wood product or solid, biomass feedstock is mounded and is not being turned or moved.

SOLID BIOFUEL. Densified biomass made ~~with or without additives~~ in the form of cubiform, polyhedral, polyhydric or cylindrical units, produced by compressing milled biomass.

SOLID, BIOMASS FEEDSTOCK. The basic materials~~, including agricultural residues, including but not limited to corn cobs, corn stover, rice hulls, and peanut hulls; herbaceous crops, including but not limited to warm- and cool-seasonal grasses; forest residue, including but not limited to branches, bark, cross-cut ends, edgings and treetops; short-rotation woody crops, including but not limited to vase-shaped stubby bushes, bamboo, willows with five to ten-year rotations and their branches, bark and stem wood; agricultural waste, including but not limited to garden or park waste, grass or flower cuttings and hedge trimmings; and dried manure;~~ from which solid biofuel is comprised, manufactured or made.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The proposed language submitted to both the 2015 IFC and the 2015 revision cycle to NFPA 13-2006 to facilitate characterization of agro-industrial biomass manufacturing operations by the IFC Membership and NFPA 13 users. Submission to and review by the NFPA Technical Committee on *Sprinkler System Discharge Criteria*, addresses such things as Commodity (Class III - see also F349-13) and Occupancy classification (Ordinary Hazard – Group2), storage (indoors and out-), as well as sprinkler system and discharge criteria for facilities storing and processing crop-residue and/or animal-based materials as "solid biomass feedstock" for industrial-scale, biofuel production.

At the Public Hearings in Dallas, the IFC Committee stated "the proposal has merit." However, Disapproval was based on:

1) Cumbersomeness of the SOLID BIOMASS FEEDSTOCK definition;

   Definitions (as modified) now use common language, are condensed and simplified.

2) Consideration for seasonal increases in volume of materials stored; and

Seasonal variances, sprinkler system selection and discharge criteria are addressed by material Commodity (Class III - see also F349-13) and
Occupancy classifications (Ordinary Hazard – Group2), storage location (indoors and out-), and the submission to and review by the NFPA 13
Technical Committee on *Sprinkler System Discharge Criteria*.

3) Consideration for indoor storage of materials including appropriate sprinkler systems and discharge criteria

(Please see our response to 2) above.)

NOTE ALSO, that the BFICOCS has provided evidence to support a Class III Commodity classification in the form of results for heat of combustion performed at INL using the standard test methods of ASTM D5865-10a, *Standard Test Method for Gross Calorific Value of Coal and Coke Using Either an Isoperibol or Adiabatic Bomb Calorimeter* and 2) Results that INL has drawn from n US and European literature based on values in the Phyllis database, the US DOE/EERE feedstock database, and selected literature sources, showing values for a range of cellulosic, solid biomass material.

This comparative and peer-reviewed literature demonstrates that the Higher Heating Values (HHVs) for the proposed set of biomass feedstock are less than those for the two grades of Coal (Bituminous and Sub-Bituminous), Charcoal, and Wood [Douglas fir wood and Douglas fir bark (i.e., Furniture)] required for the comparative classification of Class III Commodities in Section 3203.4 of the IFC and Table A.5.6.3.3 for Class III Commodities in the forthcoming 2016 Edition of NFPA 13 (see also F349-13)

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers (ASABE).

F350-13

Final Action: AS AM AMPC____ D

F354-13
1701 (New)

Proposed Change as Submitted

Proponent: Joe McElvaney, representing self (joe.mcelvaney@gmail.com)

Add new text as follows:

CHAPTER 17
SPECIAL EVENTS

SECTION 1701
GENERAL

1701.1 Scope. Special events including trade shows and exhibitions, outdoor assembly events, outdoors mazes, special amusement buildings, and special scaffolding structures shall comply with this chapter and Section 1028. Temporary indoor vehicle displays and vehicle competition or demonstrations shall comply with this chapter and Section 314.

1701.2 Permits. Permits shall be required as set forth in Sections 105.6 and 105.7.

1701.3 Site plans. A detailed site plan shall be submitted to the fire code official with each permit application for approval.

1. **Outdoor events:** The permit application and site plan shall be submitted a minimum of 30

    1. Business days prior to the event. Site plans shall include, but not be limited to:
    2. Means of egress,
    3. Location and width of exits and aisles,
    4. Location of exit signs,
    5. Location of fencing or means used to confine attendees,
    6. Total square footage of enclosed space,
    7. Location and arrangement of all tents, booths or cooking equipment,
    8. Locations of fire apparatus access roads,
    9. Location of fire protection equipment,
    10. Type and location of heating and electrical equipment where applicable,
    11. Location of temporary staffed water stations and permanent water fountains.

2. **Trade shows and exhibitions:** The permit application and site plan shall be submitted a minimum of 30 business days prior to the event. Site plans shall include, but not be limited to:

    1. The means of egress,
    2. Location and width of exits and aisles,
    3. Location of exit signs,
    4. Total square footage of space,
    5. Location and arrangement of all booths and cooking equipment,
    6. Location of all fire protection equipment,
    7. Type and location of heating and electrical equipment where applicable, and
    8. Location of covered or multi-level exhibits or booths.

3. **Mazes.** The permit application and site plan shall be submitted a minimum of 30 business days prior to the event. Site plans shall include, but not be limited to:

    1. Means of egress,

2. Location and width of exits and aisles,
3. Location of exit signs,
4. Total square footage of space,
5. Location and arrangement of all booths and cooking equipment,
6. Location of all fire protection equipment,
7. Location of means to confine attendees,
8. Locations of fire apparatus access roads,
9. Type and location of heating and electrical equipment where applicable, and
10. Location of structures.

At the time of permit application, the event coordinator shall submit to the fire code official, a letter from the property owner authorizing the use of the site, the address of the site, dates and hours of operation and names and 24-hour phone numbers of at least two principals.

4. **Temporary indoor vehicle displays:** The permit application and site plan shall be submitted a minimum of 10 business days prior to the display of electric, liquid- or gas-fueled vehicles, boats or other motor craft. Floor plans shall include, but not be limited to:

   1. The means of egress,
   2. Location and width of exits and aisles,
   3. Location of exit signs,
   4. Total square footage of space,
   5. Location and arrangement of all booths and cooking equipment,
   6. Location of all fire protection equipment,
   7. Type and location of heating and electrical equipment where applicable and
   8. Location and size of exhibits and booths, and
   9. Location of structures.

   Exception: Auto dealerships.

5. **Vehicle competition or demonstration.** The permit application and site plan shall be submitted a minimum of 10 business days prior to the competition or demonstration of electric, liquid- or gas-fueled vehicles, boats or other motor craft. A floor plan shall include, but not be limited to:

   1. The means of egress,
   2. Location and width of exits and aisles,
   3. Location of exit signs,
   4. Total square footage of space,
   5. Location and arrangement of all booths and cooking equipment,
   6. Location of all fire protection equipment,
   7. Type and location of heating and electrical equipment where applicable and
   8. Location and size of exhibits and booths, and
   9. Location of structures, and
   10. Fire apparatus access roads where applicable.

SECTION 1702
DEFINITIONS

1702.1 Definitions. The following words and terms are defined in Chapter 2.

ALLOWABLE USE AREA.
CROSS AISLES.
EXHIBITS.
FIXTURES.
FLAME EFFECT.
MAIN AISLE.

MAZE.
OUTDOOR ASSEMBLY EVENT.
SPECIAL EVENT.
TEMPORARY STRUCTURES.
TRADE SHOWS OR EXHIBITIONS.

1703
GENERAL REQUIREMENTS

1703.1 Access for firefighting and medical services. Approved vehicle access for fire fighting and medical services shall be provided in accordance with Chapter 5.

1703.2 Combustible storage. Combustible materials stored at special events shall be stored in approved locations and containers.

1703.3 Crowd managers. Crowd managers shall be provided where the fire code official determines that an indoor or outdoor gathering warrants crowd control. Crowd managers shall be in accordance with Section 403.3.

1703.4 Decorative materials and furnishings. Curtains, drapes and decorations including, but is not limited to drapes, signs, banners, acoustical materials, cotton, hay, fabric, paper, straw, moss, split bamboo, and wood chips shall be flame resistant as demonstrated by testing in accordance with NFPA 701, or provide documentation of flame retardancy. Field flame test shall be in accordance with Section 317. Materials that cannot be treated for flame retardancy shall not be used unless approved by the fire code official. This includes but is not limited to oilcloth, tarpaper, nylon, plastic cloth, and other plastic materials.

1703.5 Fire protection equipment clearance. Clearance around all fire protection equipment shall be in accordance with Section 901.10.

1703.6 Fire extinguishers. Fire extinguishers shall be in accordance with Section 906 and NFPA 10

1703.7 Fire watch. Fire watch shall be in accordance with Sections 115 and 403.1.

1703.8 Fireworks, pyrotechnics. Fireworks and pyrotechnics shall comply with Chapter 56.

1703.9 Lasers. Lasers shall comply with State of Arizona regulations.

1703.10 Housekeeping. The special event area and related areas shall be kept free from combustible debris at all times

1703.11 LP-gas heaters. Fuel supplies for liquefied-petroleum gas-fired heaters shall comply with Chapter 61 and the International Fuel Gas Code.

1703.12 Open flame devices. Open flame devices shall comply with Section 308.

1703.13 Waste disposal. Combustible debris shall not be accumulated at special events. Combustible debris, rubbish and waste material shall be removed from special events at the end of each shift of work. Combustible debris, rubbish and waste material shall not be disposed of by burning on the site unless approved.

SECTION 1704
TRADE SHOWS AND EXHIBITIONS

1704.1 General. Trade shows and exhibitions conducted within any occupancy shall comply with Chapter 17 and Section 314.

1704.2 Vehicles. Liquid- and gas-fueled and electric vehicles, boats or other motor-craft **and equipment** used for display, competition or demonstration within a building shall be in accordance with Section 314.

1704.3 Means of egress. Means of egress shall comply with this section and the requirements of Chapter 10.

1704.3.1 Travel distance. The maximum travel distance from any point in an exhibit to an exit access shall not exceed 50 feet (15240mm).

1704.3.2 Aisles. Aisles shall comply with Sections 1704.3.2.1 and 1704.3.2.2.

1704.3.2.1 Aisle width. Minimum aisle width in a trade show or exhibition shall comply with the following:

Square Footage of Trade Show or Exhibition	Minimum Aisle Width
Greater than 15,000 square feet (1393m^2)	10 feet (4572mm)
5,000 square feet (465 square meters) to 15,000 square feet (1393m^2)	8 feet (2438mm)
Less than 5,000 square feet (465 m^2)	6 feet (1829mm)

1704.3.2.2 Obstructions. Aisles shall be kept clear of all obstructions, including but not limited to, fixtures and displays of goods for sale, chairs, tables, product, displays, vehicles, and trailer tongues.

1704.3.4 Exit signs. Exit signs shall be visible from all locations in the occupancy.

1704.4 Exhibit construction and materials. The materials used for an exhibit shall comply with Section 1704.6 and Chapter 8

1704.4.1 Materials. Exhibit materials shall be one of the following:

1. Noncombustible or limited-combustible materials.
2. Wood that is greater than ¼-inch (6mm) nominal thickness
3. Wood ¼-inch (6mm) nominal thickness or less that is pressure-treated fire-retardant wood meeting the requirements of NFPA 703, Standard for Fire Retardant Impregnated Wood and Fire Retardant Coatings for Building Materials. The product shall be marked or labeled by the manufacturer. The product shall not be painted or similarly modified until the material has been inspected and the marking or labeling verified, or provide documentation acceptable to the fire code official.

1704.4.1.1 Flame retardant materials. Materials shall comply with Chapter 8.

1704.4.1.2 Wall and ceiling coverings. Textile wall coverings, such as carpeting and similar products used as wall or ceiling finishes shall comply with Chapter 8 and NFPA 101 Chapter 10.

1704.4.1.3 Plastics. Plastics shall be limited to those that comply with Chapter 8. Plastics used in trade shows and exhibitions with an occupant load of 300 or more shall be Class A or Class B. Plastics used in trade shows and exhibitions with an occupant load of less than 300, shall be Class A, Class B or Class C.

1704.5 Combustible materials storage. Combustible materials storage shall comply with Sections 1704.5.1 and 1704.5.2.

1704.5.1 Quantity. Combustible materials shall be limited to a one-day supply

1704.5.2 Location. Storage of combustible materials behind exhibits, booths, or tents is prohibited. Combustible materials, including but not limited to wood crates, paper and cardboard boxes, shall be stored outside the building in an approved area or in a storeroom having a fire-resistance rating of at least one hour and protected by an approved automatic fire-extinguishing system

1704.6 Covered exhibit and booth fire protection. Fire protection for covered exhibits and booths shall comply with Sections 1704.6.1 and 1704.6.2.

1704.6.1 Automatic sprinkler systems. An approved automatic sprinkler system shall be provided in covered exhibits and booths exceeding 300 square feet. Each level of multi-level exhibit booths shall be protected throughout, including the uppermost level where the uppermost level is covered with a ceiling.

1704.6.2 Smoke detectors. Single-station smoke detectors shall be provided in all enclosed, covered exhibits and vehicles exceeding 120 square feet (111,484 cm^2).

1704.7 Multi-level booths. Construction documents for all multi-level exhibits shall be approved and stamped by a licensed structural engineer or architect and shall be submitted with the permit application. This includes any exhibit where a live load is proposed above the exhibit area floor level, regardless of the accessibility of the area to the public. Upper levels of multi-level booths with an occupant load greater than 10 persons shall have at least 2 remote exits.

1704.8 Hazardous Materials. Hazardous materials shall comply with Section 1704.10 and Chapters 51 through 67.

1704.8.1 Specific prohibitions. The following hazardous materials shall not be stored, handled or used in trade shows and exhibitions:

1. Division 1.1, 1.2, 1.3, and 1.5 explosives as classified by the U.S. Department of Transportation.
2. Detonable, Class I and Class II organic peroxides.
3. Class I-A flammable liquids.
4. Class 4 and Class 3 oxidizers.
5. Class 4 and Class 3 (unstable) reactive materials.
6. Class 3 water-reactive materials.
7. Pyrophoric materials.
8. Highly toxic materials
9. Toxic gases.
10. Fueling or defueling of flammable or combustible that are stored or used as liquids, cryogenics or compressed gases.

1704.9 Demonstration cooking and warming equipment or devices. Cooking and warming devices for demonstration purposes only shall be in accordance with Sections 1704.9.1 through 1704.9.4.1.

1704.9.1 Public Isolation. Equipment and devices shall be isolated from the public by not less than 4 feet (1219mm) or by a noncombustible 3-sided barrier between the equipment and devices and the public.

1704.9.2 Protection. Single-well cooking equipment using combustible oils or solids shall meet the following:

1. A noncombustible lid shall be immediately available. The lid shall be of sufficient size to cover the cooking well completely.
2. The cooking surface shall not exceed 288 square inches (18,580mm).
3. The equipment shall be placed on a noncombustible surface.
4. The equipment shall be separated from each other by a horizontal distance of not less than 2 feet (609mm).

1704.9.3 Cooking equipment shall be separated from combustible materials by a horizontal distance of at least 2 feet (609mm).

1704.9.4 Butane. Butane for cooking equipment shall be limited to one 10 oz cylinder and one spare in storage, of the same size, per appliance. Storage location shall be approved by the fire code official.

1704.9.4.1 Portable butane-fueled appliances. Portable butane-fueled appliances are allowed in restaurants and in attended commercial food catering operations where fueled by not more than two 10 oz (0.3 L) LP-Gas capacity, nonrefillable butane containers that have a water capacity not exceeding 1.08 lb (0.5 kg) per container. The containers shall be directly connected to the appliance, and manifolding of containers is not permitted. Storage of cylinders is limited to 24 containers, with an additional 24 permitted where protected by a 2-hour fire resistance–rated barrier.

SECTION 1705
OUTDOOR ASSEMBLY EVENTS

1705.1 General. Outdoor assembly events shall be in accordance with Section 1705.2 through 1705.4.6 and Chapter 10.

1705.2 Occupant load. The fire code official shall establish an occupant load for the event site.

1705.3 Exits. Exits shall comply with Chapter 10 and be as remote from each other as practical shall and be provided as follows:

Occupant Load	Minimum Number of Exits
1 to 500	2
501 to 1,000	3
1,001 or 1,500	4
each additional 500 persons	36 additional inches of exit width

1705.3.1 Width. The aggregate clear width of exits shall be a minimum of 36 inches wide (914mm) for each 500 persons to be accommodated.

1705.3.2 Signs. Exits shall be identified with signs that read “EXIT”. The signs shall be weather-resistant with lettering on a contrasting background. The lettering shall be of sufficient height and brush stroke to be immediately visible from 75 feet (22,860mm). Placement of the exit signs shall be approved by the fire code official.

1705.4 Concession stands, food booths, and retail booths. Concession stands/food booths and retail booths shall be in accordance with Sections 1705.4.1 through.

1705.4.1 Distances. A minimum of 20 feet (6096mm) shall be provided between every 150 linear feet (45,720mm) of booth space. A minimum of 30 feet (9144mm) shall be provided between booths used for cooking and the vehicles, generators, or any other internal combustion engine. A minimum of 10 feet (3048 mm) shall be provided between booths used for cooking and amusement rides or devices.

Exception: Hotdog carts that are licensed by the City for use in right-of-ways.

1705.4.2 Cooking appliances or devices isolation. Cooking appliances or devices shall be isolated from the public by not less than 4 feet (1219 mm) or by a non-combustible 3-sided barrier between the equipment and devices and the public.

1705.4.3 Cooking equipment protection. Single-well cooking equipment using combustible oils or solids shall comply with the following:

1. A noncombustible lid shall be immediately available. The lid shall be of sufficient size to cover the cooking well completely.
2. The cooking surface shall not exceed 288 square inches (18,580mm).

3. The equipment shall be placed on a noncombustible surface.

4. The equipment shall be separated from each other by a horizontal distance of not less than 2 feet (609mm).

1705.4.4 Liquefied petroleum gas (LP-gas). LP-gas shall be in accordance with Chapter 38 and NFPA 58.

1705.4.4.1 Maximum number and quantity. A maximum of a total aggregate water capacity of 50 gallons (95L) of LP-gas is permitted at one concession stand or booth used for cooking.

1705.4.4.2 LP-gas high-pressure cylinder hoses. Hoses shall be designed for a working pressure of 350 PSIG with a safety factor of 5 to 1 and shall be continuously marked with LP-GAS, PROPANE, 350 PSI WORKING PRESSURE, and the manufacturer's name or trademark. Hose assemblies, after the application of couplings, shall have a design capability of 700 PSIG. Hose shall not exceed 12 feet (3638 mm) unless approved by the fire code official.

1705.4.4.3 LP-gas low-pressure cylinder hoses. Hoses with a working pressure of 5 psig shall be allowed when a fix regulator is set a 5 psi and is connected directly to the LP GAS cylinder. The hose shall not exceed 12 feet (3638 mm) unless approved by the fire code official.

1705.4.4.4 Storage of containers. Containers shall be stored in accordance with Chapter 38.

1705.4.5 Generators / electrical. A permit from the Planning and Development Department shall be obtained where required. The generators shall be installed at least 10 feet (3048mm) from combustible materials, and shall be isolated from the public by physical guard, fence, or enclosure installed at least 3 feet (914mm) away from the internal combustion power source, and be provided with compliant portable fire extinguisher per Section 906 and NFPA 10.

1705.4.6 Temporary water stations. Where outdoor temperatures are expected to exceed 90^{o}F (35^{o}C$^{)}$, the event sponsor shall provide and maintain a minimum of one staffed water station for each 1,000-projected attendance. The water station shall include adequate water supply, cups, and a means for rapid replenishing of exhausted water. Each water station shall be located as far apart as practicable to allow ease of access for event attendees.

SECTION 1706
SPECIAL AMUSEMENT BUILDINGS

1706.1 General. [B] Special amusement buildings shall be in accordance with Sections 1706.2 through 1706.4.1 and Section 411 of the International Building Code.

Exception: Amusement buildings or portions thereof, which are without walls or a roof and are constructed to prevent the accumulation of smoke.

1706.2 Use of combustible decorative materials. Use of combustible decorative materials shall be in accordance with Chapter 8.

1706.3 Assistance. Adult monitors with flashlights shall be available to provide assistance in the event someone becomes lost or disoriented. One adult monitor shall be provided for every 60 person.

1706.4 Automatic sprinkler system. Special amusement buildings shall be equipped throughout with an automatic sprinkler system in accordance with Chapter 9.

1706.4.1 Temporary special amusement buildings. Where the special amusement building is temporary, the sprinkler water supply shall be of an approved temporary means. The sprinkler piping shall be connected to a temporary water supply having sufficient capacity (flow and pressure) to supply residential or standard quick spray response sprinkler heads at a minimum design density of 0.15 gpm per square foot of protected floor area. The design shall be based on flowing the six most hydraulically remote sprinkler heads. Should the temporary amusement building contain less than six heads, the design shall assume that all heads are flowing simultaneously.

The temporary water supply may be connected to a domestic water line, a fire line, or temporary on-site storage tank as long as the minimum design densities are met. An indicating type control valve shall be installed in an accessible location between the sprinkler system and the connection to the water supply.

When the temporary sprinkler system is installed from a domestic water line, back flow prevention shall be provided in accordance with the requirements of the Arizona State Plumbing Code.

SECTION 1707
MAZES

1707.1 General. Mazes including, but not limited to corn stalk or hedge mazes, shall be in accordance with Section 1707.

1707.1.2 Safe refuge areas. Safe refuge areas shall be established outside of the maze or building and structure, and not closer than 50 feet (15240mm).

1707.1.3 Paths. Paths throughout the maze shall be a minimum of 36 inches (914mm) clear and unobstructed width.

1707.1.4 Separation. A minimum of 20 feet (6096mm) shall be provided between mazes and buildings and structures. The 20-foot (6096mm) clearance shall be free from vegetation and obstructions.

1707.1.5 Means of egress. Each exit shall be a minimum of 6 feet (1828mm) wide.

1707.1.5.1 Travel distance. The maximum travel distance to reach an exit access shall not exceed 75 feet (22,860mm). The travel distance shall be determined by using the maze path.

1707.1.5.2 Number. The travel distance required to reach an exit access shall determine the number of exits required. Locking devices shall not be allowed on exits when the maze is occupied.

1707.1.5.3 Exit signs. Exit signs shall be provided next to or above each exit. The lettering shall be a minimum of 12 inches (305mm) high with 2-inch (51mm) brushstroke. The signs shall read EXIT with lettering in a color contrasting to the sign’s background.

1707.2 Event plans. The following plans shall be submitted to the fire code official.

1707.2.1 General fire safety plan. The plan shall include, but not be limited to procedures that shall be used to prevent over-drying of vegetation throughout the site, documentation of decorative materials flame-retardancy, the maximum number of attendees.

1707.2.2 Security plan. The plan shall document who shall provide security (e.g., off-duty Police Officers, Sheriff’s posse, employees). Each security personnel shall be provided with a 2-way radio and flashlight.

1707.2.3 Evacuation plans. The plan shall document the responsibilities of all on-site employees. The plan shall also document how attendees will be evacuated, and where they will be evacuated.

1707.2.4 Maze rules. Maze rules shall be posted at maze entrance.

1707.3 Employee responsibilities. Each employee shall be familiar with the evacuation plan and with fire extinguisher locations. Documentation of training shall be provided to the fire code official.

1707.3.1 Guides. An employee shall be responsible for guiding a group of not more than 14 attendees through the maze. Each employee shall be provided with a minimum of one flashlight and two-way radio. The employees shall be responsible for detecting and reporting fire or smoke to a competent person posted at the maze main entrance and begin evacuation procedures.

1707.3.2 Main entrance employee. Each maze shall be manned by an employee at the entrance. The employee shall be capable of communicating with the employees and shall be provided with a cellular telephone. When the main entrance employee receives a report of smoke, fire or injury, the employee shall immediately call 9-1-1.

1707.4 Watering. Corn stalk and hedge mazes shall be provided with sufficient water and at a frequency that prevents the vegetation from becoming dry or brittle. Failure to comply with this provision is an imminent hazard and the fire code official shall issue a stop order.

1707.5 Buildings and structures. When buildings and structures are intended to be occupied by attendees, the building and structure shall comply with Section 1706.

SECTION 1708
COVERED MALL BUILDINGS

1708.1 General. Temporary use of the common pedestrian area within a covered mall building for promotional, Group E, Group A, Group M or similar activities shall be in accordance with Section 1708.

1708.2 Main aisle width. Main aisles shall be a minimum of 10 feet (3048mm) in width or the minimum required means of egress width, whichever is greater, and shall be maintained in accordance with Chapter 10. Main aisles shall not be obstructed.

1708.2.1 Cross aisle width. Cross aisles shall be a minimum of 15 feet (4572mm) in width or the required means of egress width, whichever is greater, and shall be maintained in accordance with Chapter 10.

1708.2.2 Fueled equipment. Liquid- or gas-fueled, or electric appliances, tools, apparatus, craft or vehicles shall be displayed in a mall in accordance with Section 314. LP-gas powered floor maintenance machines may be used when in accordance with Chapter 38.

1708.3 Combustible decorative materials. Combustible decorative materials shall be in accordance with Chapter 8.

1708.4 Fixtures. Fixtures shall not be located in main aisles or cross aisles.

Reason: This new chapter provide rules and regulation for special event that occur indoor and outdoors in location that may not be designed to hold this type of event.

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

Analysis: The 11 proposed defined terms for Chapter 2 listed in in Section 1702.1 were not provided.

1701 (NEW)-F-MCELVANEY

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the code change is not yet ready for inclusion in the code. The committee noted that there are many terms in the proposal that need definitions and that more realistic thresholds for the requirements need to be established. The proposal also references Arizona state law which is inconsistent with code style. The proposal also lacks a comprehensive reason statement. It was suggested that this material could be suitable for an adoptable appendix.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

APPENDIX K
TRADE SHOWS AND EXHIBITIONS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION K101
GENERAL

K101.1 General. Trade shows and exhibitions with temporary vender displays or booths within any occupancy shall be in accordance with this appendix and all other applicable requirements of the International Fire Code.

Exceptions:

1. Exhibition areas that occupy less than 1500 square feet of floor area in unsprinklered buildings, provided they do not include any multi-level exhibits or booths and have at least two remote exits in compliance with IFC Section 1021.
2. Exhibition areas that occupy less than 3000 square feet of floor area in buildings equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, provided they do not include any covered or multi-level exhibits or booths and have at least two exits in compliance with IFC Section 1021.

K101.2 Permit required. An operational permit for trade shows and exhibitions shall be required as set forth in Section 105.6.

K101.3 Application. An application to hold a trade show or exhibition shall be provided to the fire code official prior to the start of the trade show in a time frame established by the local authority. The application shall include a site plan that identifies:

1. The means of egress,
2. Location and width of exits and aisles,
3. Location of exit signs,
4. Total square footage of space,
5. Location and arrangement of all booths and cooking equipment,
6. Location of all fire protection equipment,
7. Type and location of heating and electrical equipment where applicable,
8. Location of covered or multi-level booths.
9. Construction documents for multi-level booths
10. Location and quantity of highly combustible goods storage.

SECTION K102
DEFINITIONS

K102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

COVERED BOOTH. An exhibit that has something placed over the exhibit above floor level that resembles a roof, canopy, tent or other obstruction, other than vertical signs or banners.

MULTI-LEVEL BOOTH. An exhibit that has a second level or tier constructed on top of the exhibit or portion of the exhibit that is accessible to the public, or that includes a live load above the exhibit area floor level, regardless of the accessibility of the area to the public.

SECTION K103
PUBLIC SAFETY FOR EVENTS

K103.1 Public safety plan. Where the *fire code official* determines that the nature of the exhibition, display or activities therein pose an increased hazard to public safety, the *fire code official* shall have the authority to order the development of public safety plan that complies with section 403.2.1.

K103.2 Fire watch personnel. When, in the opinion of the *fire code official*, it is essential for public safety in a trade show or exhibition because of the number of persons, or the nature of the performance, exhibition, display, or activity, the owner, agent or lessee shall provide one or more fire watch personnel in accordance with section 403.1.

K103.3 Crowd managers. Trained crowd managers shall be provided for trade shows and exhibitions in accordance with Section 403.3.

SECTION K104
INTERIOR FINISH AND DECORATIVE MATERIALS

K104.1 General. 801.1 Scope. Interior finish, trim, furnishings, and decorative materials used in exhibition areas shall comply with section K104 and Chapter 8.

K104.2 Interior finish. The materials used for wall and ceiling finishes of exhibits, booths and displays used in exhibition areas shall comply with one of the following:

1. Materials in exhibition areas in unsprinklered buildings shall comply with Class A requirements when tested in accordance ASTM E84 or UL 723.
2. Materials in exhibition areas in buildings equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 shall comply with Class B requirements when tested in accordance ASTM E84 or UL 723.
3. Materials in exhibition areas of sprinklered or unsprinklered building shall comply with NFPA 286 requirements in accordance with Section 803.1.2.

    Exceptions:

    1. Materials having a thickness less than 0.036 inch (0.9 mm) applied directly to the surface of walls and ceilings.
    2. Exposed portions of structural members complying with the requirements of buildings of Type IV construction in accordance with the International Building Code shall not be subject to interior finish requirements.

K104.3 Textiles. Textiles used as interior wall and ceiling finish materials, including materials having woven or nonwoven, napped, tufted, looped or similar surface, shall comply with Section 803.5.

K104.4 Decorative materials. All *decorative materials* applied over the booth or exhibit interior finish for decorative, acoustical or other effect including curtains, draperies, fabrics and streamers shall comply with Section 807.

K104.5 Signs. Foam plastic signs that are not affixed to interior building surfaces shall comply with Section 808.3.

K104.6 Fire-retardant coatings Fire retardant coatings shall comply with Section K104.1 and with Section 803.4.

SECTION K105
MULTI-LEVEL BOOTHS

K105.1 Construction documents. Construction documents for all *multi-level booths* shall be approved and stamped by a licensed structural engineer or architect and shall be submitted with the permit application.

K105.2 Structural design. *Multi-level booths* shall be designed and constructed to comply with Chapter 16 of the International Building Code.

K105.3 Means of egress. Upper levels of *multi-level booths* with an occupant load greater than 10 persons shall have at least 2 remote exits.
K105.4 Automatic sprinkler systems. An approved temporary automatic sprinkler system shall be provided in multi-level booths exceeding 300 square feet in floor area per story. Each covered level of multi-level exhibit booths shall be protected throughout.

K105.5 Smoke alarms. Smoke alarms shall be installed in an approved location on the ceiling of each covered level of multi-level booths when the floor area of a level exceeds 120 square feet.

SECTION K106
COVERED BOOTHS

K106.1 Automatic sprinkler systems. An approved temporary automatic sprinkler system shall be provided in covered booths exceeding 300 square feet in floor area.

K106.2 Smoke alarms. Smoke alarms shall be installed in an approved location on the ceiling of covered booths with a floor area that exceeds 120 square feet.

SECTION K107
STORAGE AND OPERATIONS

K107.1 Storage and operations. Storage and operation in trade shows and exhibition areas shall comply with Section K107.2 through K107.7.

K107.2 Hazardous materials. Hazardous materials shall not be stored, handled or used in trade shows and exhibitions except as specifically permitted elsewhere in this code for Group A occupancies.

K107.3 Vehicles. Liquid- or gas-fueled vehicles, boats or other motorcraft shall not be located in a trade show or exhibition area, except as permitted in section 314.4.

K107.4 Fueled equipment. Fueled equipment including, but not limited to, motorcycles, mopeds, lawn-care equipment, portable generators and portable cooking equipment, shall not be stored,
operated or repaired within a trade show or exhibition area, except as permitted in section 313.

K107.5 Highly combustible goods. The display of highly combustible goods, including but not limited to fireworks, flammable or combustible liquids, liquefied flammable gases, oxidizing materials, pyroxylin plastics and agricultural goods within 5 feet (1524 mm) of and exits and exterior exit doors is prohibited when a fire involving such goods would rapidly prevent or obstruct egress.

K107.6 Combustible materials. Combustible materials storage within trade show and exhibition areas shall comply with sections 315.

K107.7 Cooking and open flame devices. Cooking equipment and open flame devices shall not be used in exhibition areas except as allowed in Section 308. Cooking equipment shall be separated from combustible materials by a horizontal distance of not less than 2 feet.

SECTION K108
MEANS OF EGRESS

K108.1 Means of egress. Means of egress within the trade show and exhibition area shall comply with this section and Chapter 10, taking into consideration the exhibit layout and anticipated crowd movement during the event.

K108.2 Storage in aisles. Aisles in the exhibition area shall be kept free of obstructions that would inhibit egress from the exhibition area during all periods in which the general public is present, including rolled up floor coverings, exhibit containers, supplies and other materials.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

The original proposal was a very complex set of requirements for covering special events. Similar sets of requirements have been successfully used in jurisdictions such as Phoenix and Las Vegas. The IFC committee disapproved the original proposal due to a number of factors, including a lack of definitions, a lack of minimum thresholds, a belief that the proposal was not yet ready for inclusion in the code, and might be better suited as an adoptable appendix.

The Fire Code Action Committee, who was not the original proponent, saw value in developing requirements for an adoptable appendix covering larger, more complex trade shows and exhibitions, especially those that include covered and multi-level booths, which pose unique safety hazards. The public comment addresses all of the concerns included in the committee reason statement, as follows:

This material is better suited for an adoptable appendix – DONE, the public comment is proposed as an adoptable Appendix K.

More realistic thresholds need to be established – DONE, the original proposal covered special events of all sizes, which conceivable covered a single tabletop booth. Section K101.1 limits the scope of the Appendix to exhibition areas over 1500 sq. ft. in unsprinklered buildings, and 3000 sq. ft. in sprinklered buildings. Exhibits including covered and multi-level booth are covered by these requirements regardless of size due to their unique safety concerns.

Several terms need definitions – DONE, with the scaled back scope and length of the proposal many of the terms that previously needed definitions were eliminated, Section K102 includes the definitions that are needed to properly apply the requirements in the proposed Appendix.
The proposal references Arizona state law – DONE, these references were removed.
Lacks a comprehensive reason statement – DONE, see the following:

> This proposed appendix is intended to address hazards associated with larger, more complex trade shows and exhibitions. Although many of these requirements are already included in various locations in the IFC, some of the more important items, such as requirements for covering covered booths and multi-story booths are not in the existing code. In addition, having the requirements covering these events in a single location makes it easier for those organizing exhibitions, and individual exhibitors who are unfamiliar with the entire fire code to locate the requirements that are applicable to them.

K101.1 The minimum square foot thresholds clarify that the appendix does not cover small trade shows, like those with traditional tabletop displays and small booths. It only covers the larger exhibitions, and those with covered and multi-level booths, which pose additional safety concerns.
K101.3 clearly defines the information needed to obtain a permit for one of these larger exhibitions. Having this information in writing makes it easier for all parties to understand the information needed to gain approval for the exhibition.
K103 includes a convenient pointer to public safety related requirements in Chapter 4 of the IFC.
K104 includes a set of interior finish requirements that are applicable to an event in a Group A occupancy where there is a significant amount of interior finish material in the exhibits and booth themselves that was not present in the building when it was initially designed. Due to the potential fuel loading in the exhibition area, interior finish and trim requirements are required to comply Class A and Class B in unsprinklered and sprinkler buildings, respectfully. Cross references to other applicable requirements in Chapter 8 were provided in this section as a convenience to the code user.
K105 and K106 include requirements designed to provide an acceptable level of safety for the hazards associated with multi-level and covered booths. Both of these booth types have the ability to block sprinkler protection provided in the room in which the exhibition is held, and also can include a significant amount of fuel loading, which justifies temporary automatic sprinklers for the larger booths. In addition multi-level booths present concerns with structural integrity, which warrants being designed and constructed in accordance with Chapter 16 of the IBC.
K107 includes basic requirements for storage in exhibitions, and certain operations.
K108 includes a pointer to Chapter 10 means of egress requirements, and also restricts storage in aisles of exhibitions when the general public is present.

F354-13
Final Action: AS AM AMPC____ D

F360-13

908.7 (IBC [F]908.7) through 908.7.7 (IBC [F]908.7.7) (New); 1103.9; 202

Proposed Change as Submitted

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Delete Sections 908.7 (IBC [F]908.7) and 908.7.1 (IBC [F]908.7.1) in their entirety and substitute as follows:

~~**908.7 (IBC [F]908.7) Carbon monoxide alarms.** Group I or R occupancies located in a building containing a fuel-burning appliance or in a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in Chapter 2 of the *International Building Code*, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be considered an attached garage.~~

> ~~**Exception:** *Sleeping units* or *dwelling units* which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:~~
>
> ~~1. The *sleeping unit* or *dwelling unit* is located more than one story above or below any story which contains a fuel-burning appliance or an attached garage;~~
> ~~2. The *sleeping unit* or *dwelling unit* is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and~~
> ~~3. The building is equipped with a common area carbon monoxide alarm system.~~

~~**908.7.1 (IBC [F]908.7.1) Carbon monoxide detection systems.** Carbon monoxide detection systems, which include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720 shall be permitted. The carbon monoxide detectors shall be *listed* as complying with UL 2075.~~

908.7 (IBC [F]908.7) Carbon monoxide alarms. Carbon monoxide alarms shall be installed in new buildings in accordance with Sections 908.7.1 through 908.7.7. Carbon monoxide alarms shall be installed in existing buildings in accordance with Section 1103.9.

908.7.1 (IBC [F]908.7.1) Where required. Carbon monoxide alarms shall be provided in Group I-1, I-4, and R occupancies in the locations specified in 908.7.2 where any of the conditions in Sections 908.7.1.1 through 908.7.1.4 exist.

908.7.1.1 (IBC [F]908.7.1.1) Fuel-burning appliances and fuel burning fireplaces. Carbon monoxide alarms shall be provided in dwelling units and sleeping units that contain a fuel-burning appliance or a fuel burning fireplace.

908.7.1.2 (IBC [F]908.7.1.2) Forced air furnaces. Carbon monoxide alarms shall be provided in dwelling units and sleeping units served by a fuel-burning, forced air furnace.

908.7.1.3 (IBC [F]908.7.1.3) Fuel burning appliances outside of dwelling units and sleeping units. Carbon monoxide alarms shall be provided in dwelling units and sleeping units located in buildings that contain fuel-burning appliances or fuel burning fireplaces.

Exception:

1. Carbon monoxide alarms shall not be required in dwelling units and sleeping units if there are no communicating openings between the fuel-burning appliance or fuel burning fireplace and the dwelling unit or sleeping unit.
2. Carbon monoxide alarms shall not be required in dwelling units and sleeping units if a carbon monoxide alarm is provided:
   2.1 In an approved location between the fuel burning appliance or fuel burning fireplace and the dwelling unit or sleeping unit, or
   2.2 On the ceiling of the room containing the fuel burning appliance or fuel burning fireplace.

908.7.1.4 (IBC [F]908.7.1.4) Private garages. Carbon monoxide alarms shall be provided in dwelling units and sleeping units in buildings with attached private garages.

Exceptions:

1. Carbon monoxide alarms shall not be required if there are no communicating openings between the private garage and the dwelling unit or sleeping unit.
2. Carbon monoxide alarms shall not be required in dwelling units and sleeping units located more than one story above or below a private garage.
3. Carbon monoxide alarm shall not be required if the private garage connects to the building through an open-ended corridor.

908.7.1.4.1 (IBC [F]908.7.1.4.1) Exempt garages. For determining compliance with Section 908.7.1.4, an *open parking garage*, complying with Section 406.5 of the *International Building Code*, or an *enclosed parking garage* complying with Section 406.6 of the *International Building Code* shall not be considered a private garage.

908.7.2 (IBC [F]908.7.2) Locations. Where required by Section 908.7.1, carbon monoxide alarms shall be installed in the locations specified in Sections 908.7.2.1 through 908.7.2.2.

908.7.2.1 (IBC [F]908.7.2.1) Dwelling units. Carbon monoxide alarms shall be installed in dwelling units outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

908.7.2.2 (IBC [F]908.7.2.2) Sleeping units. Carbon monoxide alarms shall be installed in sleeping units.

Exception: Carbon monoxide alarms shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the sleeping unit where the sleeping unit or its attached bathroom do not contain a fuel burning appliance and are not served by a forced air furnace.

908.7.3 (IBC [F]908.7.3) Power source. Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in buildings without commercial power, battery powered carbon monoxide alarms shall be an acceptable alternative.

908.7.4 (IBC [F]908.7.4) Listings. Carbon monoxide alarms shall be listed in accordance with UL 2034.

908.7.5 (IBC [F]908.7.5) Combination alarms. Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 2034 and UL 217.

908.7.6 (IBC [F]908.7.6) Carbon monoxide detection systems. Carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide alarms and shall comply with Sections 908.7.6.1 through 908.7.6.3.

908.7.6.1 (IBC [F]908.7.6.1) General. Carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed in accordance with UL 2075.

908.7.6.2 (IBC [F]908.7.6.2) Locations. Carbon monoxide detectors shall be installed in the locations specified in Section 908.7.2. These locations supersede the locations specified in NFPA 720.

908.7.6.3 (IBC [F]908.7.6.3) Combination detectors. Combination carbon monoxide/smoke detectors installed in carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide detectors, provided they are listed in accordance with UL 2075 and UL 268.

908.7.7 Maintenance. Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with NFPA 720. Carbon monoxide alarms and carbon monoxide detectors that become inoperable or begin producing end-of-life signals shall be replaced.

Add new text as follows:

SECTION 202
GENERAL DEFINITIONS

[B] PRIVATE GARAGE. A building or portion of a building in which motor vehicles used by the tenants of the building or buildings on the premises are stored or kept, without provisions for repairing or servicing such vehicles for profit

Revise as follows:

1103.9 Carbon monoxide alarms. Existing Group ~~I~~ I-1, I-4 and ~~or~~ R occupancies ~~located in a building containing a fuel-burning appliance or a building which has an attached garage~~ shall be provided with ~~be equipped with single-station~~ carbon monoxide alarms in accordance with Section 908.7, except that the carbon monoxide alarms shall be allowed to be solely battery powered.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This proposal clarifies the requirements for carbon monoxide alarm installations. The intent is to provide protection for occupants of dwelling units and sleeping units within Group I-1, I-4, and R occupancies, which are locations where occupants are likely to be sleeping. Protection is provided from carbon monoxide that may be generated from faulty fuel burning appliance both inside and outside of the dwelling unit or sleeping unit, or from motor vehicle exhaust emanating from vehicles in attached private garages. It is assumed that a fuel burning appliance also includes a fuel burning fireplace. Specific details on the proposal are as follows.

1. The definition of PRIVATE GARAGE is identical to the IBC definition that was approved as part of proposal G59-12.
2. The entire section was reformatted to provide requirements in a more logical order.
3. Section 908.7 clarifies that the section only applies to new constructions, and that Section 1103.9 applies to existing occupancies.
4. Section 908.7.1 now only requires CO alarms are to be provided in Group I-1, I-4 and R occupancies, not all Group I occupancies as required in the existing code. It was felt that CO alarms were not warranted in Group I-2 and I-3 occupancies.
5. The code currently requires CO alarms to be provided in buildings that contain fuel burning appliances, with no additional details. Sections 908.7.1.1 through 908.7.1.3 describe the specific conditions when CO alarms are and are not required with regard to fuel-burning appliances.
6. Section 908.7.1.3 covers situations where dwelling units and sleeping units do not contain a fuel burning appliance, but such an appliance is included in a common area of the building. A good example of this is a multistory hotel that has all electric HVAC in the sleeping units, but perhaps a fireplace in the lobby, forced air heating in the common area, and a boiler in an equipment room. In these situations it is not reasonable to provide CO alarms in every sleeping room on every

floor of the hotel, where there are no sources of carbon monoxide. Having a few strategically located Co alarms in common areas will provide a reasonable level of protection for the sleeping units and dwelling units.

Exception 1 to this section covers situations where CO emanating from the fuel burning appliance has no direct path to a dwelling unit or sleeping unit, such as a water heater in an equipment room that only has access from the exterior of the building, and no openings through which the CO can get to dwelling units or sleeping units. An interior door, between this equipment room and a dwelling unit, even if it is self-closing, would not allow this exception to be used.

Exception 2 to this section requires the installation of a one or more CO alarms in approved locations between fuel burning appliances and the nearest dwelling unit or sleeping unit, or on the ceiling of the room in which a fuel burning appliance is located. CO alarms are only required where there are communicating openings including ducts, concealed spaces, interior hallways, stairs and spaces between the fuel-burning appliance or fuel burning fireplace and the dwelling unit or sleeping unit where air can flow from the appliance to the dwelling unit or sleeping unit.

7. The code currently requires CO alarms to be provided when the building has an attached garage, other than an open parking garages or enclosed parking garages that contain mechanical ventilation systems. The proposal keeps these basic concepts, but clarifies that CO alarms are required when the building has an attached private garage (which is defined in section 406.3 of the IBC). The proposal also does not require CO alarms to be provided when the private garage is attached to the building by an open ended corridor (a term used in the IBC and IFC, which is commonly called a breeze way).
8. The code currently deferred to NFPA 720 for identifying where CO alarms are to be located. In order to make the code more user friendly, Section 908.7.2 now describes the locations where CO alarms are to be provided. In some cases this differs from NFPA 720 required locations, but again is intended to provide protection for CO emanating from motor vehicles in attached private garages or from faulty fuel-burning appliances located either inside or outside of the dwelling unit or sleeping unit. .
9. Section 908.7.3 clarifies that CO alarms are required to be hard wired into building power, similar to smoke alarms, with one exception.
10. Section 908.7.5 addresses combination CO/smoke alarms, which are listed and readily available.
11. Section 908.7.6 includes more comprehensive requirements for CO detection systems as compared to the current code requirements. It requires these systems to comply with NFPA 720, but clarifies that detectors must be installed in the locations specified in Section 908.7.2 (not as specified in NFPA 720). It also allows combination CO/smoke detectors to be used.
12. Section 908.7.7 covers maintenance of devices and requires inoperative and end-of-life CO alarms to be replaced.
13. Section 1103.9 was revised to avoid duplicating section 908.7 requirements, and to allow battery powered CO alarms to be used to retrofit existing buildings, which is consistent with the retrofit provisions in the IRC.

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

908.7 (NEW)-F-ZUBIA-FCAC

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify proposal as follows:

908.7 (IBC [F] 908.7) Carbon monoxide alarms. Carbon monoxide alarms shall be installed in new buildings in accordance with Sections 908.7.1 through 908.7.7. Carbon monoxide alarms shall be installed in existing buildings in accordance with Section 1103.9.

908.7.1 (IBC [F] 908.7.1) Where required. Carbon monoxide alarms shall be provided in Group I-1, I-2, I-4, and R occupancies in the locations specified in 908.7.2 where any of the conditions in Sections 908.7.1.1 through 908.7.1.4 exist.

908.7.1.1 (IBC [F] 908.7.1.1) Fuel-burning appliances and fuel burning fireplaces. Carbon monoxide alarms shall be provided in dwelling units and sleeping units that contain a fuel-burning appliance or a fuel burning fireplace.

908.7.1.2 (IBC [F] 908.7.1.2) Forced air furnaces. Carbon monoxide alarms shall be provided in dwelling units and sleeping units served by a fuel-burning, forced air furnace.

908.7.1.3 (IBC [F] 908.7.1.3) Fuel burning appliances outside of dwelling units and sleeping units. Carbon monoxide alarms shall be provided in dwelling units and sleeping units located in buildings that contain fuel-burning appliances or fuel burning fireplaces.

Exception:

1. Carbon monoxide alarms shall not be required in dwelling units and sleeping units if there are no communicating openings between the fuel-burning appliance or fuel burning fireplace and the dwelling unit or sleeping unit.
2. Carbon monoxide alarms shall not be required in dwelling units and sleeping units if a carbon monoxide alarm is provided:
   2.1 In an approved location between the fuel burning appliance or fuel burning fireplace and the dwelling unit or sleeping unit, or

2.2 On the ceiling of the room containing the fuel burning appliance or fuel burning fireplace.

908.7.1.4 (IBC [F]908.7.1.4) Private garages. Carbon monoxide alarms shall be provided in dwelling units and sleeping units in buildings with attached private garages.

Exceptions:

1. Carbon monoxide alarms shall not be required if there are no communicating openings between the private garage and the dwelling unit or sleeping unit.
2. Carbon monoxide alarms shall not be required in dwelling units and sleeping units located more than one story above or below a private garage.
3. Carbon monoxide alarm shall not be required if the private garage connects to the building through an open-ended corridor.

908.7.1.4.1 (IBC [F]908.7.1.4.1) Exempt garages. For determining compliance with Section 908.7.1.4, an *open parking garage*, complying with Section 406.5 of the *International Building Code*, or an *enclosed parking garage* complying with Section 406.6 of the *International Building Code* shall not be considered a private garage.

908.7.2 (IBC [F]908.7.2) Locations. Where required by Section 908.7.1, carbon monoxide alarms shall be installed in the locations specified in Sections 908.7.2.1 through 908.7.2.2.

908.7.2.1 (IBC [F]908.7.2.1) Dwelling units. Carbon monoxide alarms shall be installed in dwelling units outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

908.7.2.2 (IBC [F]908.7.2.2) Sleeping units. Carbon monoxide alarms shall be installed in sleeping units.

Exception: Carbon monoxide alarms shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the sleeping unit where the sleeping unit or its attached bathroom do not contain a fuel burning appliance and are not served by a forced air furnace.

908.7.3 (IBC [F]908.7.3) Power source. Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in buildings without commercial power, battery powered carbon monoxide alarms shall be an acceptable alternative.

908.7.4 (IBC [F]908.7.4) Listings. Carbon monoxide alarms shall be listed in accordance with UL 2034.

908.7.5 (IBC [F]908.7.5) Combination alarms. Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 2034 and UL 217.

908.7.6 (IBC [F]908.7.6) Carbon monoxide detection systems. Carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide alarms and shall comply with Sections 908.7.6.1 through 908.7.6.3.

908.7.6.1 (IBC [F]908.7.6.1) General. Carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed in accordance with UL 2075.

908.7.6.2 (IBC [F]908.7.6.2) Locations. Carbon monoxide detectors shall be installed in the locations specified in Section 908.7.2. These locations supersede the locations specified in NFPA 720.

908.7.6.3 (IBC [F]908.7.6.3) Combination detectors. Combination carbon monoxide/smoke detectors installed in carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide detectors, provided they are listed in accordance with UL 2075 and UL 268.

908.7.7 Maintenance. Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with NFPA 720. Carbon monoxide alarms and carbon monoxide detectors that become inoperable or begin producing end-of-life signals shall be replaced.

1103.9 Carbon monoxide alarms. Existing Group I-1, I-2, I-4 and R occupancies shall be provided with carbon monoxide alarms in accordance with Section 908.7, except that the carbon monoxide alarms shall be allowed to be solely battery powered.
Add new definition as follows:

SECTION 202
GENERAL DEFINITIONS

[B] PRIVATE GARAGE. A building or portion of a building in which motor vehicles used by the tenants of the building or buildings on the premises are stored or kept, without provisions for repairing or servicing such vehicles for profit

Committee Reason: The proposal was approved as the requirements associated with the more specific hazards within a building have been clarified. In addition, the placement of the CO alarms and CO detectors, where applicable, are more clearly specified. Previously the provisions were difficult to enforce. The modification simply added Group I-2 occupancies as it was requested that such occupancies be provided the same protection. The original provisions stated Group I occupancies which intended to address Group I-2.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 915
CARBON MONOXIDE DETECTION

~~908.7~~ 915.1 Carbon monoxide ~~alarms~~ detection. Carbon monoxide ~~alarms~~ detection shall be installed in new buildings in accordance with Sections ~~908.7.1~~ 915.1.1 through ~~908.7.7~~ 915.6. Carbon monoxide ~~alarms~~ detection shall be installed in existing buildings in accordance with Section 1103.9.

~~908.7.1~~ 915.1.1 Where required. Carbon monoxide ~~alarms~~ detection shall be provided in Group I-1, I-2, I-4, and R occupancies, and in classrooms in Group E occupancies in the locations specified in ~~908.7.2~~ 915.2 where any of the conditions in Sections ~~908.7.1.1~~ 915.1.2 through ~~908.7.1.4.1~~ 915.1.6 exist.

~~908.7.1.1~~ 915.1.2 Fuel-burning appliances and fuel burning fireplaces. Carbon monoxide ~~alarms~~ detection shall be provided in dwelling units, ~~and~~ sleeping units and classrooms that contain a fuel-burning appliance or a fuel burning fireplace.

~~908.7.1.2~~ 915.1.3 Forced air furnaces. Carbon monoxide ~~alarms~~ detection shall be provided in dwelling units, ~~and~~ sleeping units and classrooms served by a fuel-burning, forced air furnace.

> **Exception:** Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms if carbon monoxide detection is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.

~~908.7.1.3~~ 915.1.4 Fuel burning appliances outside of dwelling units, ~~and~~ sleeping units and classrooms. Carbon monoxide ~~alarms~~ detection shall be provided in dwelling units, ~~and~~ sleeping units and classrooms located in buildings that contain fuel-burning appliances or fuel burning fireplaces.

Exceptions:

1. Carbon monoxide ~~alarms~~ detection shall not be required in dwelling units, ~~and~~ sleeping units and classrooms if there are no communicating openings between the fuel-burning appliance or fuel burning fireplace and the dwelling unit, ~~or~~ sleeping unit or classroom.
2. Carbon monoxide ~~alarms~~ detection shall not be required in dwelling units, ~~and~~ sleeping units and classrooms if carbon monoxide ~~alarms~~ detection is provided in one of the following locations:
   2.1 In an approved location between the fuel burning appliance or fuel burning fireplace and the dwelling unit, ~~or~~ sleeping unit or classroom, or
   2.2 On the ceiling of the room containing the fuel burning appliance or fuel burning fireplace.

~~908.7.1.4~~ 915.1.5 Private garages. Carbon monoxide ~~alarms~~ detection shall be provided in dwelling units, ~~and~~ sleeping units, and classrooms in buildings with attached private garages.

Exceptions:

1. Carbon monoxide ~~alarms~~ detection shall not be required if there are no communicating openings between the private garage and the dwelling unit, ~~or~~ sleeping unit or classroom.
2. Carbon monoxide ~~alarms~~ detection shall not be required in dwelling units, ~~and~~ sleeping units and classrooms located more than one story above or below a private garage.
3. Carbon monoxide ~~alarms~~ detection shall not be required if the private garage connects to the building through an open-ended corridor.

4. <u>Where carbon monoxide detection is provided in an approved location between openings to a private garage and dwelling units, sleeping units or classrooms, carbon monoxide detection shall not be required in the dwelling units, sleeping units or classrooms.</u>

~~908.7.1.4.1~~ <u>915.1.6</u> Exempt garages. For determining compliance with Section ~~908.7.1.4~~ <u>915.1.5</u>, an *open parking garage*, complying with Section 406.5 of the *International Building Code*, or an *enclosed parking garage* complying with Section 406.6 of the *International Building Code* shall not be considered a private garage.

~~908.7.2~~ <u>915.2</u> Locations. Where required by Section ~~908.7.1~~ <u>915.1.1</u>, carbon monoxide ~~alarms~~ <u>detection</u> shall be installed in the locations specified in Sections ~~908.7.2.1~~ <u>915.2.1</u> through <u>915.2.3</u>.

~~908.7.2.1~~ <u>915.2.1</u> Dwelling units. Carbon monoxide ~~alarms~~ <u>detection</u> shall be installed in dwelling units outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, ~~a~~ carbon monoxide ~~alarm~~ <u>detection</u> shall be installed within the bedroom.

~~908.7.2.2~~ <u>915.2.2</u> Sleeping units. Carbon monoxide ~~alarms~~ <u>detection</u> shall be installed in sleeping units.

> **Exception:** Carbon monoxide ~~alarms~~ <u>detection</u> shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the sleeping unit where the sleeping unit or its attached bathroom do not contain a fuel burning appliance and are not served by a forced air furnace.

<u>**915.2.3 Group E occupancies.** Carbon monoxide detection shall be installed in classrooms in Group E occupancies. Carbon monoxide alarm signals shall be automatically transmitted to an on-site location that is staffed by school personnel.</u>

> <u>**Exception:** Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies with an occupant load of 30 or less.</u>

<u>**915.3 Detection equipment.** Carbon monoxide detection required by 915.1 through 915.2.3 shall be provided with carbon monoxide alarms complying with Section 915.4 or with carbon monoxide detection systems complying with Section 915.5.</u>

<u>**915.4 Carbon monoxide alarms.** Carbon monoxide alarms shall comply with Section 915.4.1 through 915.4.3.</u>

~~908.7.3~~ <u>915.4.1</u> Power source. Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

> **Exception:** Where installed in buildings without commercial power, battery powered carbon monoxide alarms shall be an acceptable alternative.

~~908.7.4~~ <u>915.4.2</u> Listings. Carbon monoxide alarms shall be listed in accordance with UL 2034.

~~908.7.5~~ <u>915.4.3</u> Combination alarms. Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 2034 and UL 217.

~~908.7.6~~ <u>915.5</u> Carbon monoxide detection systems. Carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide alarms and shall comply with Sections ~~908.7.6.1~~ <u>915.5.1</u> through ~~908.7.6.3~~ <u>915.5.3</u>.

~~908.7.6.1~~ <u>915.5.1</u> General. Carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed in accordance with UL 2075.

~~908.7.6.2~~ <u>915.5.2</u> Locations. Carbon monoxide detectors shall be installed in the locations specified in Section <u>915.2</u> ~~908.7.2~~. These locations supersede the locations specified in NFPA 720.

~~908.7.6.3~~ <u>915.5.3</u> Combination detectors. Combination carbon monoxide/smoke detectors installed in carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide detectors, provided they are listed in accordance with UL 2075 and UL 268.

~~908.7.7~~ <u>915.6</u> Maintenance. Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with NFPA 720. Carbon monoxide alarms and carbon monoxide detectors that become inoperable or begin producing end-of-life signals shall be replaced.

(portions of proposal not shown remain unchanged)

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Proposals F180, F182, and F360 covered carbon monoxide alarms and were all approved in Dallas. F360 included requirements to protect occupants in dwelling units and sleeping unit from potential sources of carbon monoxide. F182 required CO detection in Group E occupancies, but differed from F360 in how the protection was to be provided.

This public comment was developed by the Fire Code Action Committee's carbon monoxide task group, which included a wide range of interested parties. It resolves conflicts between the proposals, and makes some editorial revisions to clarify the intent of the requirements, as follows:

- Changes references from "carbon monoxide alarm" to "carbon monoxide detection" in Sections 915.1, 915.2 and 1103.9 since detection can be provided by either carbon monoxide alarms or carbon monoxide detection systems.
- Maintains the same protection requirements for Group I-1, I-2, I-4, and R occupancies as approved in F360, and extends it to classrooms in Group E occupancies, except as noted below.
- For clarification, section 915.1.3 covers forced air furnaces that serve dwelling units, sleeping units or classrooms. This section only covers furnaces where a malfunction or crack in the heat exchange will cause CO to be spread from the combustion chamber to the ducts serving the building. This section does not apply to other heating systems such as boilers that circulate heated water to the building. An exception was added to 915.1.3 that allows carbon monoxide detection to be provided in the first room or area served by each main duct leaving the furnace, provided the carbon monoxide alarm signals are automatically transmitted to an approved location. Such an arrangement will detect carbon monoxide from the ducts and provide notification of the condition to an approved location, such as a reception area, engineering office, or central station. With this protection in place there is no need to provide carbon monoxide detection in each dwelling unit, sleeping unit or classroom served by the forced air furnace ducts.
- Section 915.2.3 requires carbon monoxide detection to be provided in classrooms in Group E occupancies, and not other rooms such as bathrooms, break rooms, interior hallways, gymnasiums, etc. The concept is to protect the students in rooms in which they spend a considerable amount of time in a relatively compact space. This is similar to the concept of only providing CO protection for sleeping units and dwelling units in Group I and R occupancies, and not rooms used for other purposes.
- F182 required carbon monoxide alarm signals In Group E occupancies to be automatically transmitted to a constantly attended on-site location. Proposed section 915.2.3 recognizes that many schools do not have a location that is constantly attended 24/7, requires carbon monoxide alarms to be automatically transmitted to an on-site location that is staffed by school personnel.
- Section 915.2.3 also includes an exception that does not require carbon monoxide alarms to be transmitted to an on-site location that is staffed by school personnel for very small schools with an occupant load of 30 or less. These occupancies may not have a location other than the classroom staffed by school personnel, and the carbon monoxide alarm in the classroom will provide the necessary alarm warning to the occupants. The trigger for 30 or less occupants corresponds with the fire alarm threshold for small Group E occupancies in 907.2.3.
- Section 915.3 was provided to clarify that protection can be provided by either carbon monoxide alarms or carbon monoxide detection systems, which are options recognized in F180, F360, and in the 2012 IFC.
- 915.1.5, Exception 4 was developed to provide an option for protecting against CO emanating from private garages by providing carbon monoxide detection in an approved location between openings to a private garage and dwelling units, sleeping units or classrooms. This same protection method is allowed for similar situations involving fuel burning appliances located outside of dwelling units, sleeping units and classrooms in section 915.1.4 Exceptions 2.

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Suggested code commentary for these requirements is as follows:

The Fire Code Action Committee task group that developed the carbon monoxide (CO) detection requirements included not only industry and fire service, but also users whose facilities must include this protection, so providing effective protection in a cost effective manner was a key consideration. An explanation of the approach used to provide protection is as follows:

Protected areas (in I-1, I-2, I-4, R and E occupancies) – Dwelling units, sleeping units and classrooms are the only rooms in the building that require protection from sources of potential CO.

Sources of potential CO that require protection – CO detection is required for protected areas ONLY when there is a potential source of CO that can enter or build up in the protected area. This includes (1) a fuel burning appliance in the protected area, (2) a fuel burning appliance in the building but outside of the protected area, (3) a forced air, fuel burning furnace that serves the protected area (not a boiler type system or electric heat), or (4) a private garage attached to the building,. There are several exceptions in which CO detection is not required if it is unlikely for dangerous levels of CO to be transported to the protected areas, such as an open ended corridor between a private garage and the building.

Types of protection - The 2012 IFC and this proposal allow either single or multiple station CO alarms to be used to provide protection, or CO detection systems installed per NFPA 720. In some instances annunciation is required in certain approved locations, such as Group E occupancies. It is recognized that in many buildings, especially those that require fire alarm systems to be installed, a CO detection system will be the preferred design approach, since CO detectors or combination CO/smoke detectors can be connected to a required fire alarm system control unit.

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There are several scenarios for providing CO protection for protected areas, and it is rarely necessary to provide CO detection in every protected area, as shown in the following examples:

Fuel burning appliance in the protected area – Consider these examples:

(1) A dwelling unit with a solid fuel burning fireplace, or a school classroom containing a gas-fired wall heater – CO detection must be provided in these protected areas, providing detection outside of the dwelling unit or classroom makes no sense

because the potential source of CO is within each unit. The CO alarm signal from the classroom must be transmitted to the school office.

(2) Apartment building with dwelling units that each contain a gas fireplace and gas fired water heater – CO detection must be provided in each dwelling unit. (This is likely to be a single or multiple station CO alarm).

Fuel burning appliance in the building but outside of the protected area – Consider these examples:

(1) A school building with a boiler providing heat to the classrooms, and a water heater in the same equipment room – A single CO detection unit can be provided in the equipment room, with annunciation of the CO alarm in the school office. o other CO detection is needed unless there are other sources of potential CO in the building.

(2) Hotel with a gas fireplace in the lobby and guest rooms on the same floor which are served by electric heat – A single CO detection unit can be installed on the lobby ceiling or in a location between the lobby fire place and the guest rooms. No other CO detection is needed unless there are other sources of potential CO in the building.

(3) Apartment building, with gas-fired pool heater for the indoor swimming pool, all electric heat and water heating in the dwelling units – A single CO detection unit can be installed in the pool equipment room.

Forced air, fuel burning furnace in the building – Consider this example.

(1) Patient rooms served by a forced air, fuel burning furnace – In this case providing CO detection on the furnace room ceiling does not necessarily provide protection for the patient rooms served by the furnace if, for example, the furnace has a cracked heat exchanger between the combustion chamber and the ducts serving the patient rooms, and it is pumping CO into those rooms. Protection can be provided by either (a) providing CO detection in all patient rooms served by the furnace (worst case condition) or (b) providing CO detection in the first room or area served by each main duct leaving the furnace, and a CO alarm signal that is automatically transmitted to an approved location, such as a nurses station or engineering office.

Private garage attached to a building – Consider these examples:

(1) Hotel with an attached private garage with entrances onto the first and second floor, no gas appliances – Provide CO detection in each corridor leading from the garage entrances, prior to the first guest room on each floor.

(2) Garden apartment with a breezeway attached to a private garage, no gas appliances – No CO detection is required to protect against CO emanating from the private garage.

Public Comment 2:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1103.9 Carbon monoxide ~~alarms~~ detection. Existing Group I-1, I-2, I-4, ~~and~~ R and E occupancies shall be provided with carbon monoxide ~~alarms~~ detection in accordance with Section ~~908.7~~ 915.

Exceptions:

1. ~~except that the~~ Carbon monoxide alarms shall be allowed to be solely battery powered
2. Carbon monoxide alarm signals in Group E occupancies shall not be required to be transmitted to an on-site location that is staffed by school personnel.

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Proposals F180, F182, and F360 covered carbon monoxide alarms and were all approved in Dallas. F360 included requirements to protect occupants in dwelling units and sleeping unit from potential sources of carbon monoxide. F182 required CO detection in Group E occupancies, but differed from F360 in how the protection was to be provided.

Two public comments were developed by the Fire Code Action Committee's carbon monoxide task group, which included a wide range of interested parties. They resolve conflicts between the proposals, and make some editorial revisions to clarify the intent of the requirements.

Section 1103.9 was revised to include an exception that carbon monoxide alarms in existing Group E occupancies can be solely battery powered, and that their alarm signals are not required to be transmitted to an on-site locationstaffed by school personnel. This is consistent with requirements for carbon monoxide alarms in existing Group I and R occupancies.

Public Comment 3:

John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

908.7.1 (IBC [F] 908.7.1) Where required. Carbon monoxide alarms shall be provided in Group I-1, ~~I-2,~~ I-4, and R occupancies in the locations specified in 908.7.2 where any of the conditions in Sections 908.7.1.1 through 908.7.1.4 exist.

1103.9 Carbon monoxide alarms. Existing Group I-1, ~~I-2,~~ I-4 and R occupancies shall be provided with carbon monoxide alarms in accordance with Section 908.7, except that the carbon monoxide alarms shall be allowed to be solely battery powered.

(Portions of proposal not shown remain unchanged)

Reason: The committee added Group I-2 as a floor modification with no technical justification or materials presented. There have been no deaths in hospitals from carbon monoxide poisoning. A search for technical data for nursing homes was inconclusive. There is no identified need for these carbon monoxide detectors in these types of facilities.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Public Comment 3:

Thomas G. Daly, representing The Hospitality Security Consulting Group, LLC, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearings.

Commenter’s Reasons: The proposed revisions to Sec. 908.7 and 1103.9 focus the requirements for CO alarm warning equipment at the source of CO producing appliances/equipment thereby providing for the earliest possible alarm and response. The changes would also allow for the use of combination CO/smoke alarms and detectors improving the flexibility for end users. Battery operated CO alarms would be allowed in existing buildings making such installations cost effective.

Public Comment 4:

Stacy N. Welch representing Marriott International, Inc, requests Approval as Modified by the Code Committee as Published in the Report of the Committee Action Hearings.

Commenter’s Reason: Marriott International, Inc. wishes to indicate its support for code change proposal F360 for the 2015 editions of the ICC’s International Building and Fire Codes with respect to carbon monoxide alarm for various occupancies.

With responsibility for the safety of our guests and employees I 3,800 hotels in 74 countries, carbon monoxide presents a sizable risk. With the increased awareness around carbon monoxide, in 2004 Marriott established a carbon monoxide detection policy for existing and new hotels.

The proposed code change language is clearer for both end users and enforcement officials to understand and implement; removes undefined terms which are in the 2012 IBC & IFC code sections dealing with this subject; focuses CO detection and alarms at the source of potential leaks providing earlier warning and reaction time, which closely aligns with Marriott’s long established policy.

F360-13

Final Action: AS AM AMPC____ D

FG1-13
IFGC [F] 413.2.3, IFGC [F] 413.3, IFGC [F] 413.4

Proposed Change as Submitted

Proponent: James Ranfone, American Gas Association (jranfone@aga.org)

Revise as follows:

IFGC [F] 413.2.3 General. Residential fueling *appliances* shall be *listed*. ~~The capacity of a residential fueling *appliance* shall not exceed 5 standard cubic feet per minute (0.14 standard cubic meter/min) of natural gas.~~

IFGC [F] 413.3 Location of dispensing operations and equipment. Compression, storage and dispensing *equipment* shall be located above ground ~~outside~~ outdoors.

Exceptions:

1. Compression, storage or dispensing *equipment* is allowed in buildings of noncombustible construction, as set forth in the *International Building Code*, that are unenclosed for three-quarters or more of the perimeter.
2. Compression, storage and dispensing *equipment* is allowed to be located indoors or in vaults in accordance with the *International Fire Code*.
3. Residential fueling *appliances* and *equipment* in accordance with Section 413.4. ~~shall be allowed to be installed indoors in accordance and the *equipment* manufacturer's instructions and Section 413.4.3~~.

IFGC [F] 413.4 Residential fueling appliance installation. Residential fueling *appliances* shall be installed in accordance with Sections 413.4.1 through 413.4.3.

IFGC [F] 413.4.2 Outdoor installation. Residential fueling *appliances* located outdoors shall be listed for outdoor installation and installed in accordance with the *appliance* manufacturer's instructions. Residential fueling *appliances* located outdoors shall be installed on a firm, noncombustible base.

IFGC [F] 413.4.3 Indoor installation. Residential fueling *appliances* located indoors shall be listed for indoor installation and installed in accordance with the *appliance* manufacturer's instructions. ~~Where located indoors,~~ Residential fueling *appliances* shall be vented to the outdoors. A gas detector set to operate at one-fifth of the lower limit of flammability of natural gas shall be installed in the room or space containing the *appliance*. The detector shall be located within 6 inches (152 mm) of the highest point in the room or space. The detector shall stop the operation of the *appliance* and activate an audible or visual alarm.

Reason: Residential fueling of natural gas vehicles represents a nationally-important opportunity to increase adoption of natural gas passenger cars and other light duty vehicles. Natural gas promises to be a major contributor toward reducing U. S. dependence upon foreign oil and petroleum products and making use of abundant, low cost U. S. natural gas supplies, the development of which is adding significantly to the recovery of U. S. economy.

However, the current text in IFGC Section 413.2.3 is inconsistent with modern approaches and gas flow rates being proposed for vehicle residential fueling by arbitrarily restricting residential fueling appliances to a gas flow rate of 5 standard cubic feet (of natural gas) per minute (scfm). Current research and technology development programs are targeting delivering natural gas at higher flow rates, especially at the initiation of the fueling cycle, to achieve practical vehicle refueling rates. A wide variety of technologies and commercial interests are focused on approaches for which the 5 scfm flow rate limitation would represent a technology barrier.

The current 5 scfm flow rate limitation in Section 413.2.3 raises a number of issues, including whether it is a reasonable, meaningful, or enforceable limit:

- The 5 scfm flow rate limit, if inferred as a potential leakage limit to an indoor garage or other space, is provided without a release time duration or profile, which would be required to determine how such a leak would present flammability hazards. As such, a 5 scfm limitation appears arbitrary and incomplete.

- Detailed fault tree analysis, failure modes and effects analysis, and computational fluid dynamics analysis of residential fueling appliance releases conducted by TIAX in 2004 showed that leak rates from various release scenarios and median residential garage air tightnesses and ventilation rates should be below 1 scfm to maintain steady state gas-in-air concentrations below combustible levels. The TIAX analysis suggests that a 5 scfm flow rate, when inferred as a potential leak rate, may be unsafe with respect combustion hazards in residential garages from releases from the vehicle fueling appliance and dispenser hose, as well as from the onboard vehicle fuel system.

- The 5 scfm flow limit may not be enforceable by code authorities, particularly if the listing standard (which is undefined by the current code language) does not readily provide a code official with gas flow information.
- Review of ICC records suggests that according to the 2006 ICC Code Commentary the 5 scfm limit as well as other technical provisions of Section 413 were adopted for consistency with National Fire Protection Association (NFPA) Standard 52 and based on flow rates for residential fueling appliances available at that time. NFPA Standard 52 records show that the flow rate was adopted in the 1988 standard cycle, but no specific technical justification for the flow rate limitation was provided.

Since requirements in Section 413.2.3 apply to the residential refueling appliance and specifically require it to be listed, leakage prevention and mitigation is most properly addressed in the listing standard. The proponent of this code change and a vast array of other organizations have convened a Technical Advisory Group (TAG) to draft a national consensus standard under the American National Standards Institute (ANSI) processes of CGA Group, an ANSI- recognized standards development organization (SDO) for natural gas vehicle standards. Completion of the standard is expected between 18 and 24 months from the submission date of this proposal.

The ANSI standard development activity is directly addressing the requirement in Section 413.2.3 for the residential fueling appliance to be listed and is addressing prevention and mitigation of leak hazards consistent with the 2004 TIAX analysis for critical leaks relevant to indoor refueling operations. In doing so, the ANSI standard is addressing the intent of the 5 scfm gas flow limitation but is based on preventing and mitigation releases must more conservatively than the current flow limitation approach. Leak mitigation is being included in the standard through a variety of performance-based automatic and redundant means and verified in standards-based methods of test in the design certification process. Since the ANSI process is open and invites public review, the adequacy and appropriateness of the listing requirements and methods of test a open to public input from all stakeholders and expertise. Therefore, the basis for leak prevention and mitigation will be likewise open to public review and comment.

Changes proposed to Section 413.4 address the lack of differentiation of residential fueling appliances designed for outdoor and indoor installation. The new language directs the authority having jurisdiction to the specific listing for outdoor or indoor installation and associated listing requirements for those environments, including leak prevention and hazard mitigation, environmental conditions, and other requirements for germane to the installation location. The proposed language is consistent with current direction in development of the ANSI standard, which makes this differentiation and applies relevant requirements to the appliance design certification.

Cost Impact: None.

[F] 413.2.3-FG-RANFONE

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The disapproval was based on the fact that the 2013 edition of NFPA 52 limits the residential fueling rate to 5 scfm which is being deleted from Section 413.2.3 without a compelling reason being offered; this would put the code at odds with the standard and create enforcement problems. It was also noted that the proposal is based in part upon future standards that are still under development. The committee was not prepared to approve the proposal on a “leap of faith” as suggested.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Ted A Williams, representing American Gas Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[F] 413.2.3 General. Residential fueling *appliances* shall be *listed*. <u>The capacity of a residential fueling *appliance* for indoor refueling shall not exceed 5 standard cubic feet per minute (0.14 standard cubic meter/min) of natural gas.</u>
(Portions of proposal not shown remain unchanged)

Commenter's Reason: The modification to the proposal would reinstate the 5 scfm capacity limit for residential fueling appliances listed and installed indoors. Limiting flow rate for residential fueling appliances to flows of this magnitude is only relevant for appliance installations indoors where released flows of natural gas may produce a flammable atmosphere. The original intent of limiting flow capacity of residential fueling appliances, promulgated by the National Fire Protection Association (NFPA) Standard 52, was to limit unrestricted leak rates indoors to the 5 scfm capacity flow rate in the event of a breach in appliance fuel system integrity. The current code language does not distinguish between indoor and outdoor installation, imposing unnecessary restrictions on outdoor refueling and the opportunity to raise flow rates to achieve reasonable, faster vehicle refueling rates. The proposal adds clarifying language that terms of listing need to differentiate residential fueling appliances as listed for indoor or outdoor installation.

FG1-13

Final Action: AS AM AMPC____ D

G1-13
IBC [F] 307.1

<u>Proposed Change as Submitted</u>

Proponent: Maureen Traxler, City of Seattle, WA representing Washington Association of Building Officials (Maureen.Traxler@seattle.gov)

Revise as follows:

IBC [F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *International Fire Code*. Hazardous materials stored, or used on top of roofs or canopies shall be classified as outdoor storage or use and shall comply with the *International Fire Code*.

Exceptions: The following shall not be classified as Group H, but shall be classified as the occupancy that they most nearly resemble.

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *International Fire Code*.
2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.
3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment *listed* by an *approved* testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both.
5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).
6. Liquor stores and distributors without bulk storage.

<u>7. The storage of distilled spirits and wines in wooden barrels and casks</u>

~~7~~<u>8</u>. Refrigeration systems.

~~8~~<u>9</u>. The storage or utilization of materials for agricultural purposes on the premises.

~~9~~<u>10</u>.Stationary batteries utilized for facility emergency power, uninterruptable power supply or telecommunication facilities, provided that the batteries are provided with safety venting caps and *ventilation* is provided in accordance with the *International Mechanical Code*.

~~10~~<u>11</u> Corrosives shall not include personal or household products in their original packaging used in retail display or commonly used building materials.

~~11~~<u>12</u>. Buildings and structures occupied for aerosol storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code.*

~~12~~<u>13</u>. Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per *control area* in Group M or S occupancies complying with Section 414.2.5.

~~13~~<u>14</u>. The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*.

Reason: IFC Section 5001.1 has an exception providing that "The storage of distilled spirits and wines in wooden barrels and casks" is not required to comply with the chapter's general requirements for hazardous materials. IFC Section 5701.2 states that Chapter 57's provisions for flammable and combustible liquids do not apply to "The storage of distilled spirits and wines in wooden barrels and casks". Similarly, Chapter 9 of NFPA 30-2012 Flammable and Combustible Liquids Code, exempts the storage of distilled spirits and wines in wooden barrels or casks from the general requirements for storage of liquids in containers. However, the Building Code classifies that same storage as an H-3 occupancy. It is inconsistent for the Building Code to classify an occupancy as a hazardous occupancy due to the presence of this type of storage if none of the mitigation measures are required by the Fire Code. The IFC exempts storage of spirits in wooden containers from all the IBC provisions that would otherwise apply. For example, IBC Section 415.4 requires sprinklers for all Group H occupancies—IFC Section 5004.5 requires sprinklers in indoor storage, but storage of spirits in wooden containers is not required to comply because it is exempt from Chapter 50. Adding this exception to the list of exceptions in IBC section 307.1 will eliminate this inconsistency between the codes and will eliminate unnecessary confusion about how to classify such uses and apply the IBC provisions.

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

[F] 307.1 #1-G-TRAXLER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's judgment that the materials in question do constitute a sufficient enough hazard to warrant a Group H occupancy group classification even though many of the IFC safeguards are not applicable.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Submitted.

Commenter's Reason: Contrary to the conclusion of the Fire Code Committee, the materials in question should not be classified as H-3 occupancies when no mitigation measures are required by the Fire Code. The relatively low hazard of distilled spirits and wines in wooden barrels or casks is recognized by NFPA 30 which exempts them from the general requirements for storage of liquids in containers. Similarly IFC Section 5001.1 exempts them from the Fire Code's general requirements for hazardous materials, and IFC Section 5701.2 exempts them from all the requirements for flammable and combustible liquids. It's unnecessary for the IBC to classify those materials as an H-3 occupancy.

This proposal also eliminates inconsistencies between the IBC and IFC. The IFC exempts storage of spirits and wine in wooden containers from most of the IBC provisions that would otherwise apply. For example, IFC Chapter 50 is the source of the limitations on maximum allowable quantities. In the IFC, storage of spirits in wooden containers is not required to comply because it is exempt from Chapter 50, but there is no such exception in the IBC. IBC Section 414.7.1 requires emergency alarms in buildings used for storage of hazardous materials. An identical provision appears in IFC Section 5004.9 but storage of spirits and wine in wooden containers is not required to comply because it is exempt from Chapter 50. There are many similar examples of conflicts between the IBC and IFC with regard to these materials.

Adding this exception to the list of exceptions in IBC section 307.1 will eliminate this inconsistency between the codes and will eliminate unnecessary confusion about how to classify such uses and apply the IBC provisions.

G1-13

Final Action: AS AM AMPC____ D

G9-13
IBC [F] 415.6

Proposed Change as Submitted

Proponent: Homer Maiel, PE, CBO, Town of Atherton (CA), representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay)

Revise as follows:

IBC [F] 415.6 Special provisions for Group H-1 occupancies. Group H-1 occupancies shall be in ~~buildings used for no other purpose, shall not exceed one *story* in height and be without basements, crawl spaces or other under-floor spaces.~~ *detached buildings*. Roofs shall be of lightweight construction with suitable thermal insulation to prevent sensitive material from reaching its decomposition temperature. Group H-1 occupancies containing materials that are in themselves both physical and health hazards in quantities exceeding the maximum allowable quantities per *control area* in Table 307.1(2) shall comply with requirements for both Group H-1 and H-4 occupancies.

Reason: This is only an editorial change. The entire stricken out portion is the definition for “detached buildings”. Hence replacing it with “detached buildings”

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

[F] 415.6-G-MAIEL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the fact that the critical phrase “…used for no other purpose…” does not appear in the definition so the proponent’s premise that the definition can substitute for the stricken code text is incorrect.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Homer Maiel, PE, CBO, representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IBC [F] 415.6 Special provisions for Group H-1 occupancies. Group H-1 occupancies shall be in *detached buildings,* <u>used for no other purpose.</u> Roofs shall be of lightweight construction with suitable thermal insulation to prevent sensitive material from reaching its decomposition temperature. Group H-1 occupancies containing materials that are in themselves both physical and health hazards in quantities exceeding the maximum allowable quantities per *control area* in Table 307.1(2) shall comply with requirements for both Group H-1 and H-4 occupancies.

Commenter’s Reason: The original proposal has been modified in accordance to committee's comment back in Dallas.

G9-13
Final Action: AS AM AMPC____ D

G13-13
IBC [F] 415.10.6.4

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (BFICOCS) (rjd@davidsoncodeconcepts.com)

Revise as follows:

IBC [F] 415.10.6.4 Installations in corridors and above other occupancies. The installation of HPM piping and tubing within the space defined by the walls of corridors and the floor or roof above, or in concealed spaces above other occupancies, shall be in accordance with Sections 415.10.6.1 through 415.10.6.3 and the following conditions:

1. through 3. *(No change to current text.)*
4. HPM supply piping and tubing and nonmetallic waste lines shall be separated from the corridor and from occupancies other than Group H-5 by fire barriers <u>or by an approved</u> <u>piping protective system</u> that have a fire-resistance rating of not less than 1 hour Where gypsum wallboard is used, joints on the piping side of the enclosure are not required to be taped~~, provided the joints occur over framing members~~. Access openings into the enclosure shall be protected by approved fire protection-rated assemblies.
5. *(No change to current text.)*

   Exception: Transverse crossings of the corridors by supply piping that is enclosed within a ferrous pipe or tube for the width of the corridor need not comply with Items 1 through 5.

Reason: The purpose of this proposal is to allow for additional methods of fire-resistance protection for supply piping and tubing. Depending on the configuration and installation details, a fire-resistance wrap material can provide the required fire-resistance rating.
An additional change is to eliminate the wording ", provided the joints occur over framing members" which addresses the elimination of taping joints on the supply piping side of the fire-resistance protection. The IBC Commentary states:
The elimination of the taping of the wallboard joints on the piping side of a rated assembly is in recognition of actual installation difficulties and the reduced likelihood of a fire on the interior of the wall cavity. To eliminate the taping of joints, however, the joints must occur over framing members.
If the elimination is related to the practical difficulty of taping on the inside of the barrier and the reduces likelihood of a fire on the interior of the cavity, in other words the protection is for an exposure fire, then elimination of the interior taping is not reliant on the joints being over framing members.

Cost Impact: The code change proposal will reduce the cost of construction.

[F] 415.10.6.4-G-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the proponent’s request for disapproval so he can submit a public comment to rearrange the text regarding joint taping.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert J. Davidson, Davidson Code Concepts, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IBC [F] 415.10.6.4 Installations in corridors and above other occupancies. The installation of HPM piping and tubing within the space defined by the walls of corridors and the floor or roof above, or in concealed spaces above other occupancies, shall be in accordance with Sections 415.10.6.1 through 415.10.6.3 and the following conditions:

1. through 3. *(No change to current text.)*
4. HPM supply piping and tubing and nonmetallic waste lines shall be separated from the corridor and from occupancies other than Group H-5 by fire barriers or by an approved ~~piping protective system~~ method or assembly that ~~have~~ has a fire-resistance rating of not less than 1 hour. ~~Where gypsum wallboard is used, joints on the piping side of the enclosure are not required to be taped~~. Access openings into the enclosure shall be protected by approved fire protection-rated assemblies.
5. *(No change to current text.)*

   Exception: Transverse crossings of the corridors by supply piping that is enclosed within a ferrous pipe or tube for the width of the corridor need not comply with Items 1 through 5.

Commenter's Reason: In response to the committee and public testimony concerns the specific methods have been deleted to instead refer to a generic requirement of protection with "an approved method or assembly". In recognition of the committee discussion this modified wording provides for acceptance of a wider base of solutions.

G13-13

Final Action: AS AM AMPC____ D

G14-13

IBC [F] 421, Table 509.1, 202; IFC 5808 (New); 5802.1, 202

Proposed Change as Submitted

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

IBC SECTION 421
HYDROGEN ~~CUTOFF~~ GAS ROOMS

[F] 421.1 General. Where required by the International Fire Code, hydrogen ~~cutoff~~ gas rooms shall be designed and constructed in accordance with Sections 421.1 through 421.8.

[F] 421.2 Definitions. The following terms are defined in Chapter 2:

GASEOUS HYDROGEN SYSTEM.

HYDROGEN ~~CUTOFF~~ GAS ROOM.

[F] 421.3 Location. Hydrogen ~~cutoff~~ gas rooms shall not be located below grade.

[F] 421.4 Design and construction. Hydrogen ~~cutoff~~ gas rooms not classified as Group H shall be ~~classified with respect to occupancy in accordance with Section 302.1 and~~ separated from other areas of the building in accordance with Section 509.1 ~~by not less than 1-hour fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both; or as required by Section 508.2, 508.3 or 508.4, as applicable~~ .

[F] 421.4.1 ~~Opening protectives~~ Pressure control. ~~Doors within the fire barriers, including doors to corridors, shall be self-closing in accordance with Section 716. Interior door openings shall be electronically interlocked to prevent operation of the hydrogen system when doors are opened or ajar or the room shall be provided with a mechanical exhaust ventilation system designed in accordance with Section 421.4.1.1.~~ Hydrogen gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.

~~**[F] 421.4.1.1 Ventilation alternative**. Where an exhaust system is used in lieu of the interlock system required by Section 421.4.1, exhaust ventilation systems shall operate continuously and shall be designed to operate at a negative pressure in relation to the surrounding area. The average velocity of ventilation at the face of the door opening with the door in the fully open position shall not be less than 60 feet per minute (0.3048 m/s) and not less than 45 feet per minute (0.2287 m/s) at any point in the door opening.~~

[F] 421.4.2 Windows. Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716.

[F] 421.5 Exhaust Ventilation. ~~Cutoff~~ Gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions ~~for repair garages in Chapter 5~~ of Section 502.16.1 of the *International Mechanical Code*.

[F] 421.6 Gas detection system. Hydrogen ~~cutoff~~ gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 421.6.1 through ~~421.6.3~~ 421.6.4.

[F] 421.6.1 System design. The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

<u>**[F] 421.6.2 Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.</u>

[F] <u>421.6.3</u> ~~421.6.2~~ Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the ~~cutoff~~ <u>gas</u> room.
2. Activation of the mechanical <u>exhaust</u> ventilation system.

[F] <u>421.6.4</u> ~~421.6.3~~ Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical <u>exhaust</u> ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

[F] 421.7 Explosion control. Explosion control shall be provided ~~in accordance with Chapter 9 of the International Fire Code~~ <u>where required by Section [F] 414.5.1</u>. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 27.

IBC TABLE 509.1
INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Hydrogen ~~cutoff~~ <u>gas</u> rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.

(Portions of table not shown remain unchanged)

IBC SECTION 202
DEFINITIONS

[F] HYDROGEN ~~CUTOFF~~ <u>GAS</u> ROOM. A room or space that is intended exclusively to house a gaseous hydrogen system.

Add new IFC text as follows:

<u>SECTION 5808</u>
<u>HYDROGEN GAS ROOMS</u>

<u>**5808.1 General.** Where required by the International Fire Code, hydrogen gas rooms shall be designed and constructed in accordance with Sections 5808.1 through 5808.7 and the *International Building Code*.</u>

<u>**5808.2 Location.** Hydrogen gas rooms shall not be located below grade.</u>

<u>**5808.3 Design and construction.** Hydrogen gas rooms not exceeding the maximum allowable quantities in Table 5003.1.1(1) shall be separated from other areas of the building in accordance with Section 509.1 of the *International Building Code*.</u>

<u>**5808.3.1 Pressure control.** Hydrogen gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.</u>

<u>**5808.3.2 Windows.** Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716 of the *International Building Code*.</u>

5808.4 Exhaust Ventilation. Gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions of Section 502.16.1 of the *International Mechanical Code*.

5808.5 Gas detection system. Hydrogen gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 5808.5.1 through 5808.5.4.

5808.5.1 System design. The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

5808.5.2 Gas detection system components. Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

5808.5.3 Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the gas room.
2. Activation of the mechanical exhaust ventilation system.

5808.5.4 Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical exhaust ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

5808.6 Explosion control. Explosion control shall be provided where required by Section 911.

5808.7 Standby power. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 6.

Add new IFC definition as follows:

IFC SECTION 202
DEFINITIONS

GASEOUS HYDROGEN SYSTEM. An assembly of piping, devices and apparatus designed to generate, store, contain, distribute or transport a nontoxic, gaseous hydrogen containing mixture having at least 95-percent hydrogen gas by volume and not more than 1-percent oxygen by volume. Gaseous hydrogen systems consist of items such as *compressed gas* containers, reactors and appurtenances, including pressure regulators, pressure relief devices, manifolds, pumps, compressors and interconnecting piping and tubing and controls.

HYDROGEN GAS ROOM. A room or space that is intended exclusively to house a *gaseous hydrogen system*.

Revise as follows:

5802.1 Definitions. The following terms are defined in Chapter 2:

FLAMMABLE GAS.
FLAMMABLE LIQUEFIED GAS.
GASEOUS HYDROGEN SYSTEM.
HYDROGEN GAS ROOM.
METAL HYDRIDE.
METAL HYDRIDE STORAGE SYSTEM.

Reason:

IBC Changes: The purpose of this submittal is cleanup of language, correlation with NFPA 2 "Hydrogen Technologies Code", and correlation with other portions of the IBC. NFPA 2 has been formed to provide a source document for the storage, use and handling of hydrogen and much work has gone into refining terms and requirements. For consistency the concepts and terms within the IFC, the IBC and NFPA should correlate for effective and efficient application of hydrogen technologies.

From the 2011 edition of NFPA 2:

Origin and Development of NFPA 2
"With the increased interest in hydrogen being used as a fuel source, the National Fire Protection Association was petitioned to develop an all-encompassing document that establishes the necessary requirements for hydrogen technologies. In 2006, the Technical Committee on Hydrogen Technology was formed and tasked to develop a document that addresses all aspects of hydrogen storage, use, and handling, that draws from existing NFPA codes and standards, and that identifies and fills technical gaps for a complete functional set of requirements for code users and enforcers. This document is also structured so that it works seamlessly with building and fire codes."

The term "Hydrogen Cutoff Room" is proposed to be changed to "Hydrogen Gas Room" which is the phrase used by NFPA 2 for consistency. The change would be reflected in the definition, titles and technical language found within the code.

Section [F]421.4 is modified to improved correlation of this section with Section 509 Incidental Uses. Hydrogen cutoff rooms not classified as a Group H are in Table 509 as an Incidental use. The specifications for separation are covered by 509.4.1. The "hydrogen cutoff room" was not intended to be an H Group, so the language referring to Group separated or non-separated uses is not necessary. That language will apply if a Group H classification is determined to apply. The change provides a cleaner, easier to understand application of these requirements

Section [F] 421.4.1 is modified to be consistent with the newer requirements found within NFPA 2 for hydrogen gas rooms.

Section [F]421.5 is modified to clarify that it is an "exhaust" ventilation system that is required and a pointer to the specific section in the IMC has been added instead of the generic Chapter 5 reference for clarity.

A new Section [F] 421.6.2 has been added to provide standards for the required gas detection system. This language and the referenced standards already exists in the IFC,IBC and IMC for when gas detection systems are required to be installed.

Section [F421.6.2, Item 2 and Section [F]421.6.3 are proposed to be modified by adding the word "exhaust" to add clarity that it is a "mechanical exhaust system" that is be required.

Section [F]421.7 has been modified to point to the explosion control requirements located within Chapter 4 of the IBC, they are a match for the requirements of the IFC.

IFC Changes: This is duplication of language that is currently in the building code. Because most of the requirements for hydrogen are in the Fire Code, there is a tendency to only use the IFC along with the IFGC and IMC for detailed requirements. The existence of the allowance for use of a hydrogen gas room is not always recognized. By copying the existing language to this new section in the fire code officials will not only provide for increase awareness on the application of hydrogen gas rooms, but will also highlight the systems that must be maintained.

The only modifications made were to fit the language to application out of this code as compared to the IBC as has been done with similar language duplication on other topics.

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

[F] 421-G-DAVIDSON WITH 5808-F-DAVIDSON~COMBINED

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

IBC SECTION 421
HYDROGEN <u>FUEL</u> GAS ROOMS

[F] 421.1 General. Where required by the *International Fire Code*, hydrogen <u>fuel</u> gas rooms shall be designed and constructed in accordance with Sections 421.1 through 421.8.

[F] 421.2 Definitions. The following terms are defined in Chapter 2:

GASEOUS HYDROGEN SYSTEM.

HYDROGEN <u>FUEL</u> GAS ROOM.

[F] 421.3 Location. Hydrogen <u>fuel</u> gas rooms shall not be located below grade.

[F] 421.4 Design and construction. Hydrogen <u>fuel</u> gas rooms not classified as Group H shall be separated from other areas of the building in accordance with Section 509.1.

[F] 421.4.1 Pressure control. Hydrogen <u>fuel</u> gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.

[F] 421.4.2 Windows. Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716.

[F] 421.5 Exhaust Ventilation. <u>Hydrogen fuel</u> gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions of Section 502.16.1 of the *International Mechanical Code*.

[F] 421.6 Gas detection system. Hydrogen <u>fuel</u> gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 421.6.1 through 421.6.4.

[F] 421.6.1 System design. The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the <u>hydrogen fuel gas</u> room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

[F] 421.6.2 Gas detection system components. Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

[F] 421.6.3 Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the <u>hydrogen fuel</u> gas room.
2. Activation of the mechanical exhaust ventilation system.

[F] 421.6.4 Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical exhaust ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

[F] 421.7 Explosion control. Explosion control shall be provided where required by Section [F] 414.5.1. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 27.

IBC TABLE 509.1
INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Hydrogen <u>fuel</u> gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.

(Portions of table not shown remain unchanged)

IBC SECTION 202
DEFINITIONS

[F] HYDROGEN <u>FUEL</u> GAS ROOM. A room or space that is intended exclusively to house a gaseous hydrogen system.

Add new IFC text as follows:

SECTION 5808
HYDROGEN <u>FUEL</u> GAS ROOMS

5808.1 General. Where required by this code<u>,</u> hydrogen <u>fuel</u> gas rooms shall be designed and constructed in accordance with Sections 5808.1 through 5808.7 and the *International Building Code*.

5808.2 Location. Hydrogen <u>fuel</u> gas rooms shall not be located below grade.

5808.3 Design and construction. Hydrogen <u>fuel</u> gas rooms not exceeding the maximum allowable quantities in Table 5003.1.1(1) shall be separated from other areas of the building in accordance with Section 509.1 of the *International Building Code*.

5808.3.1 Pressure control. Hydrogen <u>fuel</u> gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.

5808.3.2 Windows. Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716 of the *International Building Code*.

5808.4 Exhaust Ventilation. <u>Hydrogen fuel</u> gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions of Section 502.16.1 of the *International Mechanical Code*.

5808.5 Gas detection system. Hydrogen fuel gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 5808.5.1 through 5808.5.4.

5808.5.1 System design. The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the hydrogen fuel gas room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

5808.5.2 Gas detection system components. Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

5808.5.3 Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the hydrogen fuel gas room.
2. Activation of the mechanical exhaust ventilation system.

5808.5.4 Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical exhaust ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

5808.6 Explosion control. Explosion control shall be provided where required by Section 911.

5808.7 Standby power. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 6.

Add new IFC definition as follows:

IFC SECTION 202
DEFINITIONS

GASEOUS HYDROGEN SYSTEM. An assembly of piping, devices and apparatus designed to generate, store, contain, distribute or transport a nontoxic, gaseous hydrogen containing mixture having at least 95-percent hydrogen gas by volume and not more than 1-percent oxygen by volume. Gaseous hydrogen systems consist of items such as *compressed gas* containers, reactors and appurtenances, including pressure regulators, pressure relief devices, manifolds, pumps, compressors and interconnecting piping and tubing and controls.

HYDROGEN FUEL GAS ROOM. A room or space that is intended exclusively to house a *gaseous hydrogen system*.

Revise as follows:

5802.1 Definitions. The following terms are defined in Chapter 2:

FLAMMABLE GAS.
FLAMMABLE LIQUEFIED GAS.
GASEOUS HYDROGEN SYSTEM.
HYDROGEN FUEL GAS ROOM.
METAL HYDRIDE.
METAL HYDRIDE STORAGE SYSTEM.

Committee Reason: The committee agreed with the proponent's reason statement that the code change provides needed revisions to the IBC and the addition of requirements in the IFC on emergent hydrogen fuel technology. Approval is also consistent with committee action on related code changes F254-13, F256-13 and F303-13. The modification sets hydrogen fuel gas rooms apart from the currently defined gas room. It was pointed out by the committee that new IFC Section 5808.5.3 should be reviewed for possible violation of the Americans with Disabilities Act (ADA).

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

<u>**604.2.19 (IBC [F] 2702.2.19) Hydrogen fuel gas rooms.** Standby power shall be provided for hydrogen fuel gas rooms as required in Section 5808.7.</u>

5808.7 Standby power. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with <u>Section 604</u> ~~Chapter 6~~.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

Section 5808.7 introduced new requirements for standby power systems for hydrogen fuel gas rooms. This proposal correlates the standby power requirements for these facilities with the [proposal F59, which reformatted all references to emergency and standby power. No substantive changes were made a result of this public comment.

G14-13

Final Action:	AS	AM	AMPC____	D

PM3-13
202

Proposed Change as Submitted

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Revise as follows:

SECTION 202
DEFINITIONS

INFESTATION. The presence, within or contiguous to, a structure or premises of: insects including cockroaches, fleas, and bedbugs; pest rodents including rats and mice; vermin; or other pests. Visible pest residue or debris constitutes an infestation unless there is clear evidence that the pest is no longer present.

Reason: The current definition of infestation would appear to exclude rodents other than rats. However, rodents carry disease and, in the case of mice, may trigger an asthma attack. The proposal applies the term to all rodents.

Cockroaches, fleas and bedbugs are public health problems; the proposal specifies these insects to make clear that they are included.

The proposal clarifies that visible evidence of pest residues is a sufficient basis for action by a code official. The code official does not have to see a live pest. Many of the pests of most concern are nocturnal and their residue is the only evidence available during daylight.

Cost Impact: The proposal will not increase the cost of maintenance since this is a definition not a requirement.

202-INFESTATION-PM-MORLEY

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt the proposed revisions to the definition were ambiguous, in that the list of insects was incomplete. Further, they agreed that "visible" residue or debris did not necessarily indicate an infestation.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

INFESTATION. The presence, within or contiguous to, a structure or premises of insects, rodents~~rats~~, vermin, or other pests.

Commenter's Reason: The current definition of infestation appears to exclude rodents other than rats. However, rodents other than rats carry disease and, in the case of mice, may trigger an asthma attack. Mouse allergen has long been recognized as an important cause of occupational allergy and asthma, but only recently has it been implicated in asthma and allergic diseases in community settings. Recent studies have established that mouse allergen is detectable in most US homes, with strikingly high levels in some inner cities. In addition, about 25% of inner city children with asthma have evidence of IgE sensitization to mouse. Several studies have shown that the combination of sensitization and exposure to higher levels of mouse allergen is associated with substantial asthma morbidity, including hospitalizations.

(source: Matsui EC, Role of mouse allergens in allergic disease, Current Allergy Reports, 2009 Sep;9(5):370-5. http://www.ncbi.nlm.nih.gov/pubmed/19671380)

By approving this modest word change, the code official will be able to apply the term “infestation” to all pest rodents.

Public Comment 2:

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

INFESTATION. The presence, within or contiguous to, a structure or premises of insects~~,~~ rats, vermin, or other pests; and the appearance of fresh pest droppings, residue or debris after pest elimination and cleaning have occurred.

Commenter’s Reason: The comment clarifies that new evidence of pest residues is a sufficient basis for action by a code official. The code official does not have to see a live pest. Many of the pests of most concern are nocturnal and their residue is the only evidence available during daylight.

PM3-13

Final Action: AS AM AMPC____ D

PM6-13
304.2.1 (New), 305.3.1 (New), Chapter 8

Proposed Change as Submitted

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

304.2.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

305.3.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Add new standard to Chapter 8 as follows:

EPA U.S. Environmental Protection Agency

40 CFR 745– July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: The purpose of this proposed code language for the surfaces of the structure is to incorporate measures that reflect current knowledge about working with paint that may contain lead-based paint and thereby prevent lead poisoning. The code already requires repair of paint in poor condition. This new subsection would further require compliance with federal regulations to promote the safe repair of deteriorated paint that is likely to contain lead. These regulations have been in effect since April 2010. This change would only affect structures likely to contain lead-based paint.

Multiple studies have demonstrated that lead dust, which is caused by deteriorated lead-based paint and some methods of paint repair, is the major source of lead exposure for young children. The dangers associated with exposure to lead based paint hazards are well-known: lead is associated with a range of serious health effects on children, including detrimental effects on cognitive and behavioral development with serious personal and social consequences that may persist throughout their lifetime. More than 36 million pre-1978 US housing units contain lead-based paint.

Sections 304.2 and 305.3 fail to specifically require, on older structures that are likely to contain lead-based paint, the use of precautionary practices in order to prevent the dispersal of lead before, during, and after the repair work, in the course of complying with the code requirement to repair peeling, flaking and chipping paint. The proposal improves the current Code by adding to each section a health-protective requirement to perform the repair safely around lead-based paint, a subject currently acknowledged in the Commentary but not in the Code. The addition of the proposed new language will protect children from lead poisoning by specifying the use of federally – or state - approved lead safe work practices in making the required repairs. The lead-safe work practices are required by EPA effective April 22, 2010, for most renovation, repair and painting work in all pre-1978 homes.

The federal renovation rule and this proposal are based on a rebuttable presumption of lead's presence, which allows the property owner to demonstrate that lead is not present to be exempt from the requirements. The proposed new language includes these exceptions: structures built after lead was banned from paint used in residential structures (1977 US; earlier in some US cities; 1909 France, Belgium, Austria), and structures where the deteriorated paint has been documented to not contain lead (such as by a lead-based paint inspection or risk assessment, by the use of a test kit by a certified renovator, or through completion of another government-approved test method or ANSI standard).

The EPA 40 CFR 745 standard is available at http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml.

Cost Impact: This change will not increase the cost of maintenance since these federal and state requirements are already in place.

Staff analysis: A review of the standard proposed for inclusion in the code, EPA 40 CFR 745 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Committee Action Hearing Results

For staff analysis of the content of EPA 40 CFR745 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee was concerned that code officials would not have the qualifications or certifications to determine compliance with these lead based paint work practices. Further, as written the proposal expands the scope of the proposed CFR standard in that the standard excludes schools and adult day care facilities. The committee suggests aligning the proposed code text with the standard scope. Lastly, there was some concern that the standard was not promulgated using a consensus process.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment :

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

304.2.1 Disturbance of existing painted surfaces in buildings constructed before 1978. In Group E day care, Group I-4 child day care, Group R-2, R-3, R-4 occupancies, there shall not be visible dust, debris or residue remaining in the work area after completion of repairs that disturb painted surfaces.

> **Exception:** Where documentation from an approved test in accordance with 40 CFR 745.82(a) proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

305.3.1 Disturbance of existing painted surfaces in buildings constructed before 1978. In Group E day care, Group I-4 child day care, Group R-2, R-3, R-4 occupancies, there shall not be visible dust, debris or residue remaining in the work area after completion of repairs that disturb painted surfaces.

> **Exception:** Where documentation from an approved test in accordance with 40 CFR 745.82(a) proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Add new standard to Chapter 8 as follows:

EPA U.S. Environmental Protection Agency

40 CFR 745– July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Commenter's Reason: Based on the Committee decision, we have reduced this code change from a requirement for full compliance with the federal regulation to the essential but simple performance standard that will protect the occupant's and worker's children from exposure to harmful lead. It is consistent with the federal regulation in that clean-up is required at the end of renovation work. This requirement can be enforced by the code official with a visual inspection: no testing or special information is needed.

We have also clarified the Group I and E occupancies.

The exemption applies if the project meets one of these standards at 40 CFR 745.82(a):

1. a written determination has been made by a certified inspector or risk assessor that the components affected by the renovation are free of paint or other surface coatings that contain lead;
2. a certified renovator, using an EPA recognized test kit, has tested each component affected by the renovation and determined that the components are free of paint or other surface coatings that contain lead;
3. a certified renovator has collected a paint chip sample from each painted component affected by the renovation and a laboratory recognized by EPA has determined that the samples are free of paint or other surface coatings that contain lead.

Cost Impact: This change will not increase the cost of maintenance since federal and state renovation programs require a visual check for dust, debris or residue.

PM6-13
Final Action: AS AM AMPC____ D

PM9-13
305.3

Proposed Change as Submitted

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Revise as follows:

305.3 Interior surfaces. All interior surfaces, including windows and doors, shall be maintained in good, clean and sanitary condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster, decayed wood and other defective surface conditions shall be corrected. <u>Surfaces such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, shall have no signs of chronic or persistent excessive moisture. Material discolored or deteriorated by mold or mildew shall be cleaned, dried and repaired and the underlying cause shall be corrected. If the material has decayed or failed beyond repair, it shall be removed and replaced and the and the underlying cause shall be corrected.</u>

> <u>**Exception:** Porous materials that do not contain organic material, such as clean unpainted bricks and concrete.</u>

Reason: Mold typically grows in buildings affected by water damage. According to the Institute of Medicine of the National Academies' *Damp Indoor Spaces and Health* (2004), mold and damp indoor environments are associated with asthma symptoms in sensitized persons, coughing, wheezing, and upper respiratory tract symptoms. *See www.nap.edu/books/0309091934/html/*

In December 2007, the National Center for Healthy Housing (NCHH) and the U.S. Centers for Disease Control and Prevention (CDC) convened an Expert Panel consistent with National Institute of Health guidelines to assess the effectiveness of various interventions to make homes healthier and safer. NCHH and CDC published the report of the experts in January 2009. See www.nchh.org/LinkClick.aspx?fileticket=2lvaEDNBIdU%3d&tabid=229 for the full report.

The Expert Panel reviewed five peer-reviewed research studies on the issue of mold and allergens and concluded that "when implemented together, eliminating moisture intrusion and leaks and removal of moldy items were found to be effective in reducing asthma triggers and reducing exposures." Other provisions of the IPMC address eliminating moisture intrusion. But no provisions require action on building materials with chronic moisture issues including those materials that have failed beyond repair.

This proposal implements the Expert Panel's recommendation while providing flexibility in response to actual conditions – repair for reparable material, replacement for failed material. To ensure the health of the building's occupants, mitigation of moisture problems must be a part of the code.

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

305.3-PM-MORLEY

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal for the following reasons; no benchmarks were provided for a code official to determine excessive levels of moisture, discoloration, decay, mold, mildew, etc.; test methods should be provided that determine these levels; the code official should not be responsible for making these determinations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment :

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

305.3 Interior surfaces. All interior surfaces, including windows and doors, shall be maintained in good, clean and sanitary condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster, decayed wood and other defective surface conditions shall be corrected. <u>Carpet, paper-faced gypsum board, and other porous material that is discolored or deteriorated by persistent moisture shall be cleaned, dried and repaired, and the underlying cause of the moisture shall be corrected. If deteriorated material has decayed or failed beyond repair, it shall be removed and replaced.</u>

Commenter's Reason: Visual evidence of a moisture problem does not require special testing. To ensure the health of the building's occupants, mitigation of moisture problems must be a part of the code.

PM9-13

Final Action: AS AM AMPC____ D

PM10-13
202, 306.1, 306.1.2 New

Proposed Change as Submitted

Proponent: Meg Waltner, representing National Resource Defense Council, Andrew Burr, representing Institute for Market Transformation and Eric Makela, representing Britt Makela Group, Inc.

Add new definition as follows:

SECTION 202
DEFINITIONS

RETRO-COMMISSIONING. A systematic process for optimizing the energy efficiency of existing base building systems through the identification and correction of deficiencies in such systems, including but not limited to repairs of defects, cleaning, adjustments of valves, sensors, controls or programmed settings, and/or changes in operational practices.

Revise as follows:

SECTION 306
COMPONENT SERVICEABILITY

306.1 General. The components of a structure and equipment therein shall be maintained in good repair and operation, structurally sound and in a sanitary condition.

306.1.1 Unsafe conditions. (no change to current text)

306.1.2 Retro-commissioning. *Retro-commissioning* shall be performed on the base building systems for buildings 25,000 ft^2 or greater starting 5 years after issuance of the certificate of occupancy and continuing every 5 years for the life of the building. The building owner shall provide evidence that *retro-commissioning* has been performed and the evidence shall document that sufficient analysis, corrections and testing have been done ~~so~~ indicating that the base building systems meet items 1 through 4 below.

Exception: Retro-commissioning is not required for *let for occupancy* spaces of buildings.

1. Operating protocols, calibration, and sequencing for HVAC and service water heating systems:
   - 1.1. HVAC temperature and humidity set points and setbacks are appropriate and operating schedules reflect major space occupancy patterns and the current facility requirements;
   - 1.2. HVAC sensors are properly calibrated;
   - 1.3. HVAC controls are functioning and control sequences are appropriate for the current facility requirements;
   - 1.4. Loads are distributed equally across equipment when appropriate, such as for fans, boilers and pumps that operate in parallel;
   - 1.5. Ventilation rates are appropriate for the current facility requirements;
   - 1.6. System automatic reset functions are functioning appropriately, if applicable;
   - 1.7. Adjustments have been made to compensate for oversized or undersized equipment so that it is functioning as efficiently as possible;
   - 1.8. Simultaneous heating and cooling does not occur unless intended;
   - 1.9. HVAC system economizer controls are properly functioning, if applicable;
   - 1.10. The HVAC distribution systems, both air and water side, are balanced;

1.11 Domestic hot water systems have been checked to ensure proper temperature settings.
1.12. Water pumps are functioning as designed;
1.13. System water leaks have been identified and repaired;
1.14. HVAC equipment, such as vents, ducts, coils, valves and soot bins, is clean;
1.15. Filters are clean and protocols are in place to replace, as appropriate.

2. Operating protocols, calibration, and sequencing for lighting systems:
   2.1. Light levels are appropriate to the task;
   2.2. Lighting sensors and controls are functioning properly according to occupancy, schedule, and/or available daylight, where applicable;
3. Cleaning and repair:
   3.1. Motors, fans, and pumps, including components such as belts, pulleys, and bearings, are in good operating condition;
   3.2. Steam traps have been replaced as required to maintain efficient operation, if applicable;
   3.3. Manual overrides on existing equipment have been remediated;
   3.4. Boilers have been tuned for optimal efficiency, if applicable;
   3.5. Exposed hot and chilled water and steam pipes three (3) inches or greater in diameter with associated control valves are insulated in accordance with the International Energy Conservation Code;
   3.6 In all easily accessible locations, sealants and weather stripping are installed where appropriate and are in good condition.
4. Documentation:
   4.1. Permits for all HVAC, electrical and plumbing equipment are in order;
   4.2. Operational and maintenance record keeping procedures, such as log books and computer maintenance records, have been implemented;
   4.3. The operations and maintenance manuals, if such manuals are still available from the manufacturer, the maintenance contracts, and the most recent retro-commissioning report is on site and accessible.

Reason: A critical aspect of building maintenance is ensuring that the energy systems of a building are maintained in a state of good repair and are functioning efficiently. It has been found that, over time, due to system breakdowns and uncoordinated repairs and renovations, building energy systems drift out of proper performance -- sometimes quite dramatically. Sensors and controls can be reset so that building systems are running 24/7 rather than only when necessary, repairs can be made that solve an immediate problem but result in heating and cooling systems running simultaneously, etc. The result of these problems is a poorly performing building that can waste considerable energy while often being uncomfortable or even unhealthy.

For other equipment, such as automobiles, a regular tune-up to ensure safe and efficient operation is considered standard practice. This is becoming standard in buildings, also, through retro-commissioning. Retro-commissioning (RCx) is a process that has been developed in recent decades to ensure that building energy systems are essentially tuned up -- that they are running efficiently and that they are in a state of good repair. Retro-commissioning takes a careful look at the systems that are in place, analyzes how they could be repaired to run more efficiently, and then performs those repairs.

Several U.S. cities recently adopted RCx requirements for large buildings. In 2009, New York City passed an ordinance, Local Law 87, that requires nonresidential and multifamily housing properties over 50,000 square feet to perform RCx once every 10 years. In 2011, San Francisco passed an ordinance requiring energy audits or RCx once every 5 years.

Cost Impact: In 2009, Lawrence Berkeley National Laboratory published a study of building commissioning costs and benefits, looking at 643 buildings with a cumulative square footage of 100 million square feet. RCx was found to cost an average of $0.30 per square foot. The RCx resulted in a 16% whole-building median energy savings with an average payback of 1.1 years.

306.1-PM-BURR-MAKELA-WALTNER.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the proposed commissioning requirements were too broad and would be difficult for the code official to determine compliance. Further, these provisions do not belong in a maintenance code. A more appropriate location for these would be either the IECC or the IgCC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment :

Eric Makela, representing Britt/Makela Group, Inc., requests Approval as Submitted.

Commenter's Reason: For other equipment, such as automobiles, a regular tune-up to ensure safe and efficient operation is considered standard practice. This is becoming standard in buildings, also, through retro-commissioning. Retro-commissioning (RCx) is a process that has been developed in recent decades to ensure that building energy systems are essentially tuned up -- that they are running efficiently and that they are in a state of good repair. Retro-commissioning takes a careful look at the systems that are in place, analyzes how they could be repaired to run more efficiently, and then performs those repairs.

Retro-commissioning for existing buildings on average cost $0.27/ft^2, has an average energy savings of 15% and resulting in a 0.7 year payback. Based on a study the end result is saving anywhere from $11/ft^2 to $0.72/ft^2. The retro-commissioning requirement would only apply to building 25,000 ft^2 or greater and would not apply to the let for occupancy spaces in buildings. This would limit the requirement to tenant owned buildings and not include small retail, office or other smaller buildings. Additional information on the benefits of retro-commissioning can be found in a white paper published on the Britt/Makela Group website (www.BrittMakela.com)

The retro-commissioning requirements are applied to a building starting 5 years after the issuance of certificate of occupancy. In some cases this will mean that older buildings will be required to retro-commissioned after the jurisdiction has adopted the code. For newer buildings, the requirement will not take effect until a few years after the code is adopted.

The retro-commissioning requirements fit well into the Property Maintenance Code because it is one of the few codes that requires the building to be maintained after issuance of the Certificate of Occupancy. There is no precedent in other codes (e.g. IECC) for ensuring that the building functions as built after certificate of occupancy. The requirements for retro-commissioning are very specific on what features must be commissioned for the HVAC, water heating and lighting systems of the building. Those performing retro-commissioning must also verify that all permits for work conducted on an energy feature of the building be present.

Several U.S. cities recently adopted RCx requirements for large buildings. In 2009, New York City passed an ordinance, Local Law 87, that requires nonresidential and multifamily housing properties over 50,000 square feet to perform RCx once every 10 years. In 2011, San Francisco passed an ordinance requiring energy audits or RCx once every 5 years.

PM10-13

Final Action: AS AM AMPC____ D

PM13-13
[F] 702.4 (IFC 1030.7)

Proposed Change as Submitted

THIS CHANGE WILL BE HEARD BY THE IFC COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

[F] 702.4 (IFC 1030.7) Emergency escape <u>and rescue</u> openings. Required emergency escape <u>and rescue</u> openings shall be maintained in accordance with the code in effect at the time of construction, and the following. Required emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with the code that was in effect at the time of construction and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. <u>Where new bars, grilles, grates or similar devices, are installed in existing buildings where none presently exist, smoke alarms shall be installed in accordance with Section 907.2.11 of the *International Building Code*.</u>

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

This code proposal is attempting to clarify the requirements for existing openings that have previously approved bars, grilles, grates and similar devices on them, vs. existing or new openings that will be installing such devices on them.

The existing IBC Code Section 1029.4 states:

> 1029.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with Section 1029.2 and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. Where such bars, grilles, grates or similar devices are installed in existing buildings, smoke alarms shall be installed in accordance with Section 907.2.11 regardless of the valuation of the alteration.

Existing IPMC Section 702.4's last sentence was revised to clearly state that it is only applicable to existing openings that have previously approved bars, grilles, grates and similar devices on them.

The new proposed last sentence in this code proposal is attempting to correlate the requirement of IBC Section 1029.4 with the IPMC Section 702.4. If a new opening is provided, or an existing opening is going to be provided, with bars, grilles, grates and similar devices, then the smoke alarm requirements of IBC Section 907.2.11 are applicable to the affected residential unit. If previously approved bars, grilles, grates and similar devices are only being repaired or replaced on an existing opening then the smoke alarm requirement of IBC Section 907.2.11 would still not be applicable.

The title and first sentence were revised to indicate "rescue" openings to be consistent with other I-code language.

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

[F] 702.4-PM-BAJNAI-BCAC.DOC

Committee Action Hearing Results

This code change was heard by the IFC code development committee.

Committee Action: **Disapproved**

Committee Reason: The disapproval was based on the committee's concerns that the proposal would not require that the net clear opening size of the emergency escape and rescue opening be maintained, that smoke alarms are only required in residential dwelling or sleeping units and that it was unclear whether emergency escape and rescue openings could be covered with bars or grilles.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment :

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Submitted.

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this proposal for **As Submitted** as a necessary life safety correlation between the Property Maintenance Code and IBC Section 1029.4 which states:

> *"Where such bars, grilles, grates or similar devices are installed in existing buildings, smoke alarms shall be installed in accordance with Section 907.2.11 regardless of the valuation of the alteration."*

Based upon the code development committee's reason statement they appear to have misunderstood the application of the new sentence as well as the current requirements of IPMC Section 702.4. / IFC 1030.7.

1. The code development committee indicated concern about the net clear opening. This code change has nothing to do with the opening size – it is about smoke alarms, and when they need to be added. But to answer their question, the opening size is already covered in the current language of IPMC Section 702.4/IFC 1030.7:

   "Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with the code that was in effect at the time of construction …"

   This proposal does not change that language so the net clear opening in existence at time of construction is the minimum allowed.

2. The code development committee expressed concern that smoke alarms were only being required for dwelling or sleeping units, however, the section involved applies to "Emergency Escape Openings" that are only required for dwelling or sleeping units. This proposal does not change that application.
3. And lastly, the code development committee expressed a concern that it was unclear whether bars and grills could be installed over emergency escape and rescue openings. IBC/IFC Section 1029.4, IFC Section 1030.7 and PMC Section 704.4 all specifically allow the installation of the bars and grills over emergency and escape rescue openings.

PM13-13

Final Action: AS AM AMPC____ D

PM16-13
705 (New)

<u>Proposed Change as Submitted</u>

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

<u>**SECTION 705**</u>
<u>**CARBON MONOXIDE ALARMS**</u>

<u>**705.1 General.** Carbon monoxide alarms shall be installed in accordance with Section 1103.9 of the *International Fire Code* in Group R occupancies and in dwellings not regulated as Group R occupancies.</u>

Reason: Carbon monoxide (CO) is an odorless, tasteless, invisible gas that kills more than 300 people in homes each year. Thousands more are admitted to the hospital with carbon monoxide poisoning. This is a serious issue that affects people nationwide is all regions of the country.

The International Residential Code requires CO alarms for residences with fuel-fired appliances or attached garages. This change would make the IPMC consistent with the IRC.

This proposal expands on the requirement to specifically include portable fuel burning space heaters since these devices may not be considered an appliance, since these devices may be introduced by the property owner after construction.

The following states have required CO alarms in existing residences: Alaska, California, Colorado, Illinois, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Oklahoma, Oregon, Rhode Island, Vermont and Wisconsin. Deaths from CO are spread throughout the country as residents unwittingly use dangerous methods to stay warm in unusually cold weather.

Cost Impact: Yes, this code change proposal will increase the cost of property maintenance. A carbon monoxide alarm typically costs approximately $25.

705 (NEW)-PM-MORLEY

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee felt that this mandate would be too broad as it would affect a large majority of existing buildings. The expense for building owners and the enforceability requirements for code officials would be too great.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment :

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

705.1 General. Carbon monoxide alarms shall be installed in accordance with Section 1103.9 of the *International Fire Code* in Group R occupancies<u>.</u> ~~*and in dwellings not regulated as Group R occupancies.*~~

Commenter's Reason: While not needed in jurisdictions that have adopted the International Fire Code, the requirement is needed where the IFC is not in effect.

PM16-13

Final Action: AS AM AMPC____ D

RB2-13
R102.7.1

Proposed Change as Submitted

Proponent: David Bonowitz, Chair, Existing Buildings Subcommittee, Code Advisory Committee, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

Revise as follows:

R102.7.1 Additions, alterations or repairs. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure ~~without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.~~ <u>Alterations and repairs shall be such that the existing structure is no less complying with the provisions of this code than the existing structure was prior to the alteration or repair. For additions, alterations to the existing structure shall be made so that the existing structure with the addition is no less complying with the provisions of this code than the existing structure was prior to the addition.</u>

Reason: This proposal updates the IRC language with respect to existing buildings, in coordination with the IBC and IEBC. It clarifies, but does not change, the current intent.

In general, the IRC (with or without Appendix J) is obsolete in its terminology and language regarding existing buildings. Especially regarding structural issues, its provisions continue to use terms and formulations that have long since been revised in IBC Chapter 34 and the IEBC Work Area method. (For examples, the term "unsafe" and the labels and definitions of project types in Appendix J.) This proposal does not seek complete uniformity with the other codes, but it does attempt to correct some obsolete language that is now prone to incorrect interpretation.

In the first sentence, the proposal clarifies the main purpose, which is to require the intended addition, alteration, or repair work itself to be as for new construction. The second half of the sentence is deleted, as it has been in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The portion proposed for deletion is redundant, since the next sentence (either as is or as proposed) tells you when and how to consider the existing structure. It is also potentially confusing, since it incorrectly gives the impression that the only possibilities are either no upgrade or total upgrade of the entire building for "all of the requirements of this code."

The proposal replaces the second sentence in order to correct four problems with the current text:

- The proposal removes the word "unsafe." First, this term is redundant in R102.7.1, since any work that would make the building unsafe would certainly also "adversely affect the performance." Second, the IRC does not define "unsafe" and so relies on the IBC, but the IBC's definition is unorthodox, as it comes through the text of section 116.1, not through a formal definition. In any case, from a structural perspective, a building is unsafe when the structure is "dangerous" as defined in the IBC or IEBC, but that definition has in mind an extreme condition verging on collapse. We do not believe it is the intent of the IRC committee to allow structural modifications to dwellings that take them to a condition just shy of dangerous. (IRC Appendix J does have its own definition of dangerous, but section R102.7.1 must be able to stand on its own, since Appendix J will not necessarily be adopted. Besides, the Appendix J definition is obsolete as well and applies only to structural conditions.)
- It replaces the phrase "adversely affect the performance" with "no less complying" language consistent with IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The IRC is compliance-based, not performance-based, so vague reference to "performance" is not enforceable. More important, the "adversely affect" phrase suggests that the existing building cannot be made worse by any measure, a restriction more severe than is probably intended. That is, as long as the building still complies, some reduction in capacity should be allowed.
- It restates the provision as an enforceable instruction, not as a blanket prohibition. That is, provisions for existing buildings are more useful and effective when they say what must be done, not what is prohibited. The IBC and IEBC provisions have been revised and written with this approach since 2009.
- It separates the project types, where necessary. Here, the provisions for additions, alterations, and repairs do not vary much, but the proposal reorganizes the provision to set a precedent and make future revisions by project type easier. This is consistent with the 2009 revisions to IBC Chapter 34, the IEBC Work Area method and IRC Appendix J.

Cost Impact: None

R102.7.1 #1-RB-BONOWITZ

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this change is not needed. The existing language on performance is already consistent with the IBC and IEBC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Bonowitz, representing NCSEA Code Advisory Committee, Existing Buildings Subcommitteek requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R102.7.1 Additions, alterations or repairs. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure. <u>Where more specific requirements do not apply,</u> alterations or repairs shall be such that the existing structure is no less complying with the provisions of this code than it was prior to the alteration or prior to the occurrence of the damage that is being repaired. For additions, <u>where more specific requirements do not apply,</u> alterations to the existing structure shall be made so that the existing structure with the addition is no less complying with the provisions of this code than the existing structure was prior to the addition.

Commenter's Reason: The IRC committee, which is not expert in existing building provisions or in the IEBC methodology, simply got this one wrong. Perhaps they were confused by incorrect statements made by committee members after testimony was closed. Whatever the reason, the confusion is evident from the fact that the committee's reason for disapproval is plainly false.

The committee reason states: "The existing language on performance is already consistent with the IBC and IEBC." This is plainly false because the existing language is *not at all consistent* with the IBC and IEBC:

- Since 2009, the IBC has separated additions, alterations, and repairs into separate sections to avoid just the sort of over-generality present in R102.7.1. The IEBC Work Area method, of course, has always had separate chapters for separate project types.
- IBC and IEBC provisions for existing buildings are specific and measured. They do not require or even suggest, as the 2012 language of R102.7.1 does, that an existing building *might* be required "to comply with all of the requirements" for new construction.
- The 2012 IRC provision sets the bar for unacceptable projects where they would make the existing building unsafe. Neither the IBC nor the IEBC has any such provision. Rather, the "no less complying" language of the proposal exists in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1.
- The IBC and IEBC have no such vague provision about projects that would "adversely affect the performance of the building." In fact, extensive revisions to the IBC and IEBC over the last two cycles have quite intentionally removed such unenforceable language. Instead, the IBC and IEBC explicitly allow certain reductions in performance until a measurable and enforceable loss of compliance is reached.

If users of the IRC want the IRC to be taken seriously, they need to allow it to evolve and improve in coordination with the other I-codes. The IRC is clearly falling behind on the issue of existing IRC-eligible buildings. This proposal helps close the gap, as do proposals RB 469 and RB 470, both of which were approved as submitted for similar reasons.

Excerpts from the original proposal's reason statement:

- This proposal updates the IRC language with respect to existing buildings, in coordination with the IBC and IEBC. It clarifies, but does not change, the current intent. This proposal does not seek complete uniformity with the other codes, but it does attempt to correct some obsolete language that is now prone to incorrect interpretation.
- In the first sentence, the proposal clarifies the main purpose, which is to require the intended addition, alteration, or repair work itself to be as for new construction. The second half of the sentence is deleted, as it has been in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The portion proposed for deletion is redundant, since the next sentence (either as is or as proposed) tells you when and how to consider the existing structure.
- The proposal replaces the second sentence in order to correct four problems with the current text:
  - The proposal removes the word "unsafe." We do not believe it is the intent of the IRC committee to allow modifications to dwellings that take them to a condition just shy of "dangerous" or "unsafe."

- It replaces the phrase "adversely affect the performance" with "no less complying" language consistent with IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The IRC is compliance-based, not performance-based, so vague reference to "performance" is not enforceable. More important, the "adversely affect" phrase suggests that the existing building cannot be made worse by any measure, a restriction more severe than is probably intended. That is, as long as the building still complies, some reduction in capacity should be allowed.
- It restates the provision as an enforceable instruction, not as a blanket prohibition. That is, provisions for existing buildings are more useful and effective when they say what must be done, not what is prohibited. The IBC and IEBC provisions have been revised and written with this approach since 2009.
- It separates the project types, where necessary. Here, the provisions for additions, alterations, and repairs do not vary much, but the proposal reorganizes the provision to set a precedent and make future revisions by project type easier. This is consistent with the 2009 revisions to IBC Chapter 34, the IEBC Work Area method and IRC Appendix J.

The original proposal is modified by this Public Comment to include the phrase "where more specific requirements do not apply" in two places. This modification maintains the intent of the current phrase "unless otherwise stated."

RB2-13

Final Action: AS AM AMPC____ D

RB4-13
R104.10.1, R105.3.1.1, R112.2.1, R112.2.2, R301.2.4, R322.1

Proposed Change as Submitted

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

Revise as follows:

R104.10.1 Flood hazard areas. The building official shall not grant modifications to any provisions related to flood hazard areas as established by Table R301.2(1) ~~without the granting of a variance to such provisions by the board of appeals~~ unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R322 inappropriate.
2. A determination that failure to grant the modification would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a modification will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. A determination that the modification is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, alteration, repair, addition or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination ~~prepare a finding~~ with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamage condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, ~~the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage. Applications determined by the board of appeals to constitute substantial improvement or substantial damage~~ the proposed work is a substantial improvement or restoration of substantial damage and the building official shall require all existing portions of the entire building or structure to meet the requirements of R322.

For the purpose of this determination, a substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs necessary to restore the building or structure to its pre-damaged condition are considered substantial improvement regardless of the actual repair work performed. The term does not include:

1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or
2. Any alteration of a historic building or structure, provided that the alteration will not preclude the

continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:

2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or

2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or

2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

~~**R112.2.1 Determination of substantial improvement in flood hazard areas.** When the building official provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include:~~

1. ~~Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or~~
2. ~~Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:~~
   - ~~2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or~~
   - ~~2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or~~
   - ~~2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.~~

~~**R112.2.2 Criteria for issuance of a variance for flood hazard areas.** A variance shall only be issued upon:~~

1. ~~A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 322 inappropriate.~~
2. ~~A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.~~
3. ~~A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.~~
4. ~~A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.~~
5. ~~Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.~~

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions of Section R322. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

Reason: This proposal does three things related to existing dwellings in flood hazard areas:

1. Moves language from R112.2.2 to R104.10. The effect is to parallel both the IBC and IEBC which charge the building official with making certain determinations before granting modifications, rather than have the Board of Appeals make such determinations.
2. Moves language from R112.2.1 to R105.3.1.1. The effect is to more closely align the IRC with the IBC and IEBC, which rely on the building official to determine whether work on existing buildings in flood hazard areas meets the definitions "substantial improvement" and "substantial damage," rather than have the building official make a finding and have the Board of Appeals make such determinations
3. Clearly identify in R301.2.4 and R322.1, that the flood provisions apply to substantial improvement and substantial damage; R102.7.1 already makes clear that the IRC applies to additions, alterations, or repairs.

The IRC currently requires the Board of Appeals to do two things that are done by the building official under both the IBC and the IEBC – (1) determine whether requests for modifications to the flood provisions meet certain criteria and (2) determine whether work on existing dwellings constitutes substantial improvement or substantial damage (SI/SD). As stated in R112.1, the purpose of a Board of Appeals is to hear appeals of decisions, orders, and determinations of the building official. If the Board is charged with making decisions, such as the granting of a modification (variance) and the determination of SI/SD, then permit applicants and permittees have no recourse to appearl those decisions, except perhaps the courts. If building officials are capable of making these determinations under IBC and IEBC, then they should be permitted to do the same under the IRC.

The proposed changes to R301.2.4 and R322.1, which have the same phrasing, is to make clear that, as stated in R102.7.1, because the IRC applies to work on existing dwellings, the flood provisions apply to substantial improvement and substantial damage of existing dwellings. The added phrase is the same as used in IBC 1612.1.

Cost Impact: Costs will be reduced for permit applicants and permittees who challenge SI/SD determinations and decisions on requests for modifications (variances) because they can appeal the building official's decisions to the Board of Appeals instead of the courts. There is no change in the cost of compliance because the IRC already applies to existing dwellings and communities that participate in the NFIP have long required existing buildings that are SI/SD to be brought into compliance with the requirements for new construction.

R104.10.1-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that it substantially changes the description of a historic building in a manner that puts it in the hands of the federal government, which is the wrong direction.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gregory Wilson (FEMA) and Rebecca Quinn (RCQuinn Consulting), representing US Dept of Homeland Security, Federal Emergency Management Agency and RCQuinn Consulting, Inc. representing FEMA, requests Approval as Modified by this Public Comment,

Replace the proposal with the following:

Revise as follows:

R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, alteration, repair, addition or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamage condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a substantial improvement or restoration of substantial damage and the building official shall require all existing portions of the entire building or structure to meet the requirements of R322.

For the purpose of this determination, a substantial improvement shall mean any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs necessary to restore the building or structure to its pre-damaged condition are considered substantial improvement regardless of the actual repair work performed. The term shall not include:

1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or
2. Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:
   - 2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or
   - 2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or
   - 2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

~~**R112.2.1 Determination of substantial improvement in flood hazard areas.** When the building official provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include:~~

1. ~~Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or~~
2. ~~Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:~~
   - ~~2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or~~
   - ~~2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or~~
   - ~~2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.~~

~~**R112.2.2 Criteria for issuance of a variance for flood hazard areas.** A variance shall only be issued upon:~~

1. ~~A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 322 inappropriate.~~
2. ~~A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.~~
3. ~~A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.~~
4. ~~A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.~~
5. ~~Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.~~

Commenter's Reason: The committee action on this code change proposal was Disapproval, explained only by a concern with the description of historic building. The proposal does not, as perceived by the committee, "substantially change the description of a historic building…." The text proposed for R105.3.1.1 is simply being moved from the existing Section R112.2.1. The same language qualifying the I-Codes definition for "historic building" is in the IBC Chapter 34 Section 3409.2 and in the IEBC 1101.4.

This public comment replaces the original proposal with ONLY the portions of that proposal that affect Chapter 1, with no change to any of the originally proposed language.

The primary objective is to move certain determinations from R112 Board of Appeals into R104 Duties and Powers of the Building Official and R105 Permits. The result is to be consistent with the administrative provisions of the IBC and the IEBC. If the building official is authorized and capable of making these determinations under the IBC and the IEBC, then the building official is also capable and should be authorized to the same under the IRC. Importantly, having the building official make these determinations rather than the board of appeals increases an applicant's ability to appeal those decisions at the local level.

Public Comment 2:

Gregory Wilson (FEMA) and Rebecca Quinn (RCQuinn Consulting), representing US Dept of Homeland Security, Federal Emergency Management Agency and RCQuinn Consulting, Inc. representing FEMA, requests Approval as Modified by this Public Comment,

Replace the proposal with the following:

Revise as follows:

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions of Section R322. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

Commenter's Reason: The committee action on this code change proposal was Disapproval, explained only by a concern with the description of historic buildings.

This public comment replaces the original proposal with ONLY the portions of that proposal that affect Chapter 3, with no change to any of the originally proposed language.

It is clear in IRC Section 102.7.1 that the IRC applies to existing buildings when those buildings have additions, alterations, or repairs. The phrase proposed to be added to R301.2.4 and R322.1 is the same wording used in the IBC 1612.1. This will make it clearer that when the code applies to existing dwellings in flood hazard areas, a determination must be made as to whether the proposed work constitutes Substantial Improvement or repair of Substantial Damage (see current provisions in R105.3.1.1 and R112.2.1, which call for the building official to make a finding and for the Board of Appeals to make determinations of substantial improvement and substantial damage).

RB4-13

Final Action: AS AM AMPC____ D

RB5-13
R105.1

Proposed Change as Submitted

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Revise as follows:

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

Reason: Opening protection by impact protective systems is an important aspect in maintaining structural integrity during a hurricane event. In addition to increasing the structural performance of buildings, they play a role in the life safety of the people weathering the storm out in their residence. Observations in the field reveal many installations do not meet the standards adopted for these devices as became apparent during storms in recent years. Unfortunately, many jurisdictions do not require permits or inspections for these important structural safeguards and life safety devices because they are not addressed in the section of the code addressing required permits. With the emphasis of emergency management shifting to defending in place due to the inability of the infrastructure to handle mass evacuations, these impact protective systems, be they impact rated glass or devices, and their proper installation becomes even more important.

The hurricane protection industry estimates annual sales in unapproved and mostly bogus “hurricane protection devices” at $30M to $40M at the minimum. These products have not been tested or investigated by anyone and meet no standards. The sellers of these products target citizens and give residents a false sense of security. Requiring permits and inspections for all impact protective systems would dramatically increase the protection provided to the residents of single family dwellings.

Cost Impact: The proposal may result in a slight increase for the cost of a permit solely for projects involving installation, alteration, repair or replacement projects. For new construction there should be no cost as the permit for the building would include the installation of the impact protective system. The benefit of the requirement, however, will far outweigh any added cost in permitting by increasing the assurance that these important structural and life safety protection devices are properly designed and installed. The industry has noted cases of substandard materials, inappropriate testing or claims of testing, and improper installation of products. We believe closer scrutiny of the design and installation of these important property protection and life safety systems will result in greater protection to the public and a better value to the consumer.

Staff Analysis: Mr. Belcher has a companion change for a new Section 614 that has criteria for impact protective systems. Requirements for these types of systems are in the IRC in Section 301.2.1.2 and 612.6.

R105.1-RB-BELCHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Requiring a permit has the potential for unintended consequences of delay action before a storm. Could be further delay if a permit is required for WSP. The local jurisdiction can decide if a permit is required for this protective system.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Joseph D. Belcher, JDB Code Services, Inc., representing International Hurricane Protection Association (IHPA), requests Approval as Submitted.

Commenter's Reason: The purpose of this public comment is to request Approval as Submitted of a requirement for building permits for the installation of impact protective systems. The provision would not apply for new construction, as the building permit for the dwelling would include opening protection where required by the code. However, in light of recent history many states are engaged in wind mitigation programs to increase the ability of a structure to resist high winds encountered during hurricanes. Since the code requires opening protection in wind-borne debris regions, it only follows that permits should be required to assure oversight and code compliance to increase the safety of the public.

Opening protection by impact protective systems is an important aspect in maintaining structural integrity during a hurricane event. In addition to increasing the structural performance of buildings, they play a role in the life safety of the people weathering the storm out in their residence. Emergency management is moving toward defending in place as opposed to evacuation due to the inability of the infrastructure to safely evacuate many areas. As became apparent during storms in recent years many installations do not meet the standards adopted by the code for these devices. Unfortunately, many jurisdictions do not require permits or inspections for these important structural safeguards and life safety devices because they are not addressed in the section of the code addressing required permits. With the emphasis of emergency management shifting to defending in place due to the inability of the infrastructure to handle mass evacuations, these impact protective systems, be they impact rated glass or devices, and their proper installation becomes even more important.

The hurricane protection industry estimates annual sales in unapproved and mostly bogus "hurricane protection devices" at $30M to $40M at the minimum. These products have not been tested or investigated by anyone and meet no standards. The sellers of these products target citizens and give residents a false sense of security. Requiring permits and inspections for all impact protective systems would dramatically increase the protection provided to the residents of single family dwellings.

RB5-13

Final Action: AS AM AMPC____ D

RB6-13
R105.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R105.2 Work exempt from permit. *Permits* shall not be required for the following. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*.

Building:

1. One-story detached *accessory structures* used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 200 square feet (18.58 m^2).
2. Fences not over 7 feet (2134 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks ~~not exceeding 200 square feet (18.58 m^2) in area,~~ that are not more than 30 inches (762 mm) above *grade* at any point~~, are not attached to a *dwelling*~~ and do not serve the exit door required by Section R311.4.

Reason: This proposal deletes certain provisions of the exemption for decks. 200 square feet is an arbitrary limit and without basis. If a jurisdiction wishes to limit the size of a deck, they may do so through their local zoning regulations. There is nothing unique about these structures that make a deck that is 210 square feet in area more dangerous than one that is 190 square feet.

Furthermore, whether or not it is attached to the dwelling should make no difference. It is common practice to set these low decks adjacent to the dwelling and often homeowners wish to attach them to the dwelling for added stability. Why would we want to discourage them from making their deck more secure by requiring a permit? All too often the regulations start to get pretty restrictive regarding the connections for these low decks. The owner may wish to add a few lag bolts to stabilize the deck or they may wish to support one entire length of the deck from the house.

The risks posed do not warrant the close regulations that permitting requires. Building department resources are stretched thin. Permit fees on these decks rarely cover the cost of enforcement. Public dollars can be better spent on more significant projects.

A common argument for requiring permits for these structures is for zoning compliance. That is a lousy reason for requiring a building permit. Local zoning ordinances often regulate other structures when a building permit is not required. Certain fences, arbors, trellises, and small accessory structures come to mind. Let the zoning folks carry their own water.

Cost Impact: None

R105.2 #1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it is possible to have the same condition that is regulated by this code section on decks of any size.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Glenn Mathewson, MCP, City of Westminster, Colorado, representing North American Deck and Railing Association, requests Disapproval.

Commenter's Reason: The proponent's reason statement fails to recognize all the hazards associated with deck construction. Homeowners relying on guidance from box stores or TV shows are misled into construction practices that are hazardous to their wellbeing and to the longevity of their property. The larger the deck, the more occupants it carries and the greater the probability of someone getting hurt. As a deck gets larger, so usually does its interface with the home. With this comes a greater likelihood that commonly overlooked hazards will occur. Decks constructed over emergency escape and rescue opening windows, over cat. IV appliance vents, ledgers blocking brick weepholes and foundation vents, decks under low overhead service cables, stairs near glazing, clearances at dryer exhaust vents, combustion air intake openings, and electrical service equipment working clearances…these are all subject to code violations from a poorly designed deck. With any regulation, a line has to be drawn. Why 30" of height, not 29"? Why 200 sf and not 210 sf? A line has to be drawn somewhere, 200 SF seems fair.

As for the connection to the house, poorly flashed connections will cause damage to the structure of the home. Exterior claddings such as stucco, adhered and anchored veneers, EIFS and vinyl siding must be appropriately handled when a deck is connected.

Pictures tell a thousand words.

This category IV appliance vent was going to be buried under this deck, as was the 24" egress window well for the basement of the house (note: constructed prior to 1994 UBC when 24" was the minimum).

The contactor attached it over siding with no flashing, and buried the siding with about eight inches of dirt excavated from the piers.

Public Comment 2:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Disapproval.

Commenter's Reason: I do not agree with the proponent's original reason statement where he claims that since the existing 200 square foot limit is an arbitrary number and therefore we should just delete this limit and actually not require permits for any deck that is 30 inches or less. I do not think that most jurisdictions require permits for decks just due to zoning requirements but to verify structural designs.

I would argue that by requiring permits for decks we are able to verify that the structure is meeting the IRC requirements for structural design and therefore safe. In reality, the larger the deck, the bigger the number of people that can fit on the deck. There would be a very real possibility that if there was a failure of a deck that was 29" or 30" above the ground that people could get hurt or killed even falling at this height.

I would also argue that the best way to approach this would be to require permits for all decks no matter the size and no matter the height above ground rather than the approach that this proponent took.

RB6-13

Final Action: AS AM AMPC____ D

RB8-13
R106.1.4 (New), R702.8 (New), R703.13 (New); Chapter 44, AJ301.1.1.1 (New), AJ701 (New)

Proposed Change as Submitted

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

IRC SECTION R106
CONSTRUCTION DOCUMENTS

R106.1.4 Certifications and plans where painted surfaces are disturbed. Where a dwelling was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official one of the following:

1. Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance in accordance with 40 CFR 745 requirements for renovations.
2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.

IRC SECTION R702
INTERIOR COVERINGS

R702.8 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

IRC SECTION R703
EXTERIOR COVERING

R703.13 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

CHAPTER 44
REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency

40 CFR 745-July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

SECTION AJ301
REPAIRS

AJ301.1.1.1 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION AJ701 REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency

40 CFR 745 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: This code change proposal is to incorporate protection from lead-based paint by specifying (1) that additions, alterations, and repairs to pre-1978 homes comply with federal health-protective requirements to protect children from lead poisoning and (2) that permit applicants include, with the other construction documents, evidence of compliance.

The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code through the requirement for construction documents. Once the Code requires permit applicants to demonstrate up front their knowledge of, and plans to follow, the federal and state renovation rule requirements, the code official will be positioned to provide important oversight and leadership in preventing lead poisoning without even leaving the office. This oversight will help level the playing field between contractors who are complying with the rule and noncompliant entities who are under-pricing and undercutting their competitors. By merely asking an applicant for the missing documents, the code official can influence entities not following the law into compliance before the work even starts. In a few cases, these entities may be unaware of the regulations. Although these regulations have been in effect since April 2010, and have been adopted by 12 states, reported non-compliance is affecting the compliant contractor and continuing the problem of lead poisoning in the US.

The proposed "plan for compliance in accordance with 40 CFR 745 requirements for renovations" with the federal disclosure and work practice requirements" can take different forms depending on what documents the builder is already using. Some builders who work on pre-1978 homes are already using a form to track their upfront assessments and another form for recordkeeping. Anyone working in pre-1978 homes should have an EPA or state certification for their firm, along with at least one individual renovator certification that the renovator received at the end of the required one-day training course. These requirements are already in effect in federal and state regulation.

The plan and certifications would only be needed for a structure likely to contain lead-based paint: a pre-1978 home. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead's presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

Renovation of painted surfaces is a significant source of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.[1,2,5,8,9] Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood (μg/dL) is greatest at lead levels below 10 μg/dL. As a child's BLL increases from 1 to 10 μg/dL, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 μg/dL the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.[10]

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an "extremely low" IQ by 57%, substantially increasing the cost of special education programs.[3] Considering the costs to the special education system alone, one study conservatively estimated that it costs $38,000 over three years to educate a child with lead poisoning.[11] Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes. EBLLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.[1,4] Each 1 μg/dL reduction in the average preschool blood lead level saves $13.4 billion from the direct and indirect costs of crime.[1]

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,[12] the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 μg/dL. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 μg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 μg/dL.[6]

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk of lead exposure during and after work performed on a pre-1978 home – and level the playing field among contractors working on pre-1978 properties.

The EPA 40 CFR 745 standard is available at http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml.

References:

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4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. Arch. Dis. Child. 2009;94(11):844–848.
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12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. N Engl J Med. 1982; 306(6):367.

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

Staff analysis: A review of the standard proposed for inclusion in the code, EPA 40 CFR 745-July 1, 2012, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R106.1.4 (NEW)-RB-MORLEY

Committee Action Hearing Results

Committee Action: Disapproved

For staff analysis of the content of U.S. EPA 40 CFR 745 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Reason: The committee disapproved this proposed code change because they felt that the requirements dealing with lead are federal and should remain in that domain. All federal requirements do not belong in the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Mark Henshall, representing US Environmental Protection Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R106
CONSTRUCTION DOCUMENTS

R106.1.4 Certifications and plans where painted surfaces are disturbed. Where a dwelling was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official ~~one of the following:~~

~~1.~~ a copy of a current Renovation Repair and Painting firm certification issued by either EPA in accordance with 40 CFR 745.89 or by a state program authorized by EPA in accordance with 40 CFR 745 Subpart Q. ~~Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance in accordance with 40 CFR 745 requirements for renovations.~~

~~2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.~~

~~SECTION R702~~
~~INTERIOR COVERINGS~~

~~**R702.8 Disturbance of existing painted surfaces.** In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.~~

~~**Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.~~

~~SECTION R703~~
~~EXTERIOR COVERING~~

~~**R703.13 Disturbance of existing painted surfaces.** In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.~~

~~**Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.~~

CHAPTER 44
REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency

40 CFR 745-~~July 1, 2012~~ Lead-Based Paint Poisoning Prevention in Certain Residential Structures – July 1, 2012

Commenter's Reason: This code change proposal is to incorporate protection from lead-based paint by specifying that permit applicants include, with the other construction documents, evidence of compliance with the firm certification requirements of EPA's or an authorized states Renovation, Repair and Painting Regulation. The local building code official would have no other responsibility than to request a copy of a current Renovation Repair and Painting firm certification

EPA's Lead-Based Paint Renovation, Repair and Painting (RRP) Rule aims to protect the public from lead-based paint hazards associated with renovation, repair and painting activities. These activities can create hazardous lead dust when surfaces with lead paint, are disturbed. The rule requires workers to be certified and trained in the use of lead-safe work practices, and requires renovation, repair and painting firms to be EPA-certified. This training and adherence to lead-safe work practices will help ensure residents are not exposed to hazardous levels of lead contaminated dust.

The original proposal required "a plan for compliance for renovations in accordance with 40 CFR 745 requirements for renovations." Questions were raised as to what constituted a plan and what would be expected in terms of the code official approving such a plan. In addition, the original proposal could be interpreted to mean that local building officials were being asked to enforce a federal regulation. This modification to the original proposal has addressed these concerns.

Public Comment 2:

Jane Malone, National Center for Healthy Housing, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

R702.8 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall not leave behind visible dust, debris or residue.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

R703.13 Disturbance of existing painted surfaces. On any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall not leave behind visible dust, debris or residue.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

CHAPTER 44
REFERENCED STANDARDS

EPA
U.S. Environmental Protection Agency
40 CFR 745-July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

SECTION AJ301
REPAIRS

AJ301.1.1.1 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alterations and additions where painted surfaces are disturbed shall leave behind no visible dust, debris or residue.

> **Exception:** Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a) that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Commenter's Reason: Based on the Committee decision, we have reduced this code change from a requirement for full compliance with the federal regulation to the essential but simple performance standard that will protect occupant's and worker's children from exposure to harmful lead. It is consistent with the federal regulation in that clean-up is required at the end of renovation work. This requirement can be enforced by the code official with a visual inspection: no testing or special information is needed.

The exemption applies if the project meets one of these standards at 40 CFR 745.82(a):

1. a written determination has been made by a certified inspector or risk assessor that the components affected by the renovation are free of paint or other surface coatings that contain lead;
2. a certified renovator, using an EPA recognized test kit, has tested each component affected by the renovation and determined that the components are free of paint or other surface coatings that contain lead;
3. a certified renovator has collected a paint chip sample from each painted component affected by the renovation and a laboratory recognized by EPA has determined that the samples are free of paint or other surface coatings that contain lead.

RB8-13
Final Action: AS AM AMPC____ D

RB12-13
R202

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

SECTION R202
DEFINITIONS

ATTIC. The unfinished space between the ceiling assembly ~~of the top *story*~~ and the roof assembly.

Reason: The current definition of "attic" is insufficient in that it excludes spaces that clearly should be regulated. Attics exist at locations other than the top story. It encourages a lack of uniformity in enforcement and confusion from all users of the code.

Examples of areas where the current definition becomes problematic include rules regarding attics with limited storage, exposed foam plastics, insulation requirements, fire separations, draft stops, structural requirements, access, and ventilation. These rules are intended to apply to all attics, not just those defined as being above the top story.

Cost Impact: None

R202-ATTIC-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the term "top story" needs to be maintained for clarity purposes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: This proposal deletes the reference to "top story" from the definition of attic. This proposal was disapproved by the IRC Committee because the reason statement says the term "top story" is needed for "clarity purposes". At the beginning of the IRC is a section titled "Effective Use of the International Residential Code". In that section is an explanation of terms defined in the IRC. It states that when a term is italicized it means that the definition is uniquely used in the IRC and in those cases the published definition applies.

What follows are a number of sections from the IRC where the italicized word "*attic"* is used and therefore the definition in the IRC is clearly intended to apply.

I ask that you read through some of these code sections and apply the IRC definition of the word "attic". Every place you see "attic", think only of the top story. Does the defined term add clarity as was stated by the IRC Committee? Or, are commonly used applications of the code null and void because the definition does not include attics that may not be in the top story of a building but where applications of the code would normally occur?

As a permit holder, I would be willing to push the envelope if I didn't feel a particular code section was necessary and the definition suited my needs. Prosecutions of such "violations" would never get past the city attorney's desk. You need to be able to prosecute violations, not just write correction orders.

For example, suppose I construct a 2 story dwelling with an attached one story garage. I place a lid on the garage ceiling. I don't provide an access. I don't install collar ties in my hand framed garage roof. And, I don't ventilate the space. Can you prosecute any of these items as a code violation even though they would clearly be required in the attic of the top story of the dwelling? Not given the current text in the code and knowledge by the persons involved of the definitions.

Those who enforce the code need to be able to explain the requirements to the public. When you have differing rules that apply to very similar conditions in the same structure, that task becomes difficult and suggests to the public that the rules makers don't know what they are doing and that in turn impacts credibility. The proposed code change needs to be approved to achieve clarity and consistency.

Effective Use of the International Residential Code
Where understanding a term's definition is key to or necessary for understanding a particular code provision, the term is shown in italics where it appears in the code. This is true only for those terms that have a meaning that is unique to the code. In other words, the generally understood meaning of a term or phrase might not be sufficient or consistent with the meaning prescribed by the code; therefore, it is essential that the code-defined meaning be known.

ATTIC. The unfinished space between the ceiling assembly of the top *story* and the roof assembly.

DRAFT STOP. A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and *attics*.

R302.3 Two-family dwellings. *Dwelling units* in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a 1-hour fire-resistance rating when tested in accordance with ASTM E 119 or UL 263. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the *exterior wall*, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.
2. Wall assemblies need not extend through *attic* spaces when the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board and an *attic* draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the *dwellings*. The structural framing supporting the ceiling shall also be protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

R302.10.1 Insulation. Insulation materials, including facings, such as vapor retarders and vapor-permeable membranes installed within floor/ceiling assemblies, roof/ ceiling assemblies, wall assemblies, crawl spaces and *attics* shall have a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84 or UL 723.

R302.10.4 Exposed attic insulation. All exposed insulation materials installed on *attic* floors shall have a critical radiant flux not less than 0.12 watt per square centimeter.

R314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional *story* of the *dwelling*, including *basements* and habitable attics but not including crawl spaces and uninhabitable *attics*. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

R314.4 Power source. Smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.
2. Hard wiring of smoke alarms in existing areas shall not be required where the *alterations* or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an *attic*, crawl space or *basement* available which could provide access for hard wiring without the removal of interior finishes.

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. *Attic* access is required by Section R807.1.

R316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or kneewall, the provisions of Section R316.5.3 shall apply.

R501.1 Application. The provisions of this chapter shall control the design and construction of the floors for all buildings including the floors of *attic* spaces used to house mechanical or plumbing fixtures and *equipment*.

R502.3.1 Sleeping areas and attic joists. Table R502.3.1(1) shall be used to determine the maximum allowable span of floor joists that support sleeping areas and *attics* that are accessed by means of a fixed stairway in accordance with Section R311.7 provided that the design live load does not exceed 30 pounds per square foot (1.44 kPa) and the design dead load does not exceed 20 pounds per square foot (0.96 kPa). The allowable span of ceiling joists that support *attics* used for limited storage or no storage shall be determined in accordance with Section R802.4.

R502.3.2 Other floor joists. Table R502.3.1(2) shall be used to determine the maximum allowable span of floor joists that support all other areas of the building, other than sleeping rooms and *attics*, provided that the design live load does not exceed 40 pounds per square foot (1.92 kPa) and the design dead load does not exceed 20 pounds per square foot (0.96 kPa).

R603.3.2 Minimum stud sizes. Cold-formed steel walls shall be constructed in accordance with Figure R603.3.1(1), R603.3.1(2) or R603.3.1(3), as applicable. Exterior wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(31). Interior load-bearing wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(31) based upon an 85 miles per hour (38 m/s) Exposure A/B wind value and the building width, stud spacing and snow load, as appropriate. Fastening requirements shall be in accordance with Section R603.2.4 and Table R603.3.2(1). Top and bottom tracks shall have the same minimum thickness as the wall studs. Exterior wall studs shall be permitted to be reduced to the next thinner size, as shown in Tables R603.3.2(2) through R603.3.2(31), but not less than 33 mils (0.84 mm), where both of the following conditions exist:

1. Minimum of 1/2 inch (12.7 mm) gypsum board is installed and fastened in accordance with Section R702 on the interior surface.
2. Wood structural sheathing panels of minimum 7/16-inch-thick (11 mm) oriented strand board or 15/32-inch-thick (12 mm) plywood is installed and fastened in accordance with Section R603.9.1 and Table R603.3.2(1) on the outside surface.

Interior load-bearing walls shall be permitted to be reduced to the next thinner size, as shown in Tables R603.3.2(2) through R603.3.2(31), but not less than 33 mils (0.84 mm), where a minimum of 1/2-inch (12.7 mm) gypsum board is installed and fastened in accordance with Section R702 on both sides of the wall. The tabulated stud thickness for load- bearing walls shall be used when the *attic* load is 10 pounds per square feet (480 Pa) or less. A limited *attic* storage load of 20 pounds per square feet (960 Pa) shall be permitted provided that the next higher snow load column is used to select the stud size from Tables R603.3.2(2) through R603.3.2(31).

R611.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above-grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa).

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9), and the rafter shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or securely joined in accordance with Table R802.5.1(9) where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to the rafters. Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the *attic* shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie…

Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the *attic* space in accordance with Table R602.3(1).

R804.3.1.1 Minimum ceiling joist size. Ceiling joist size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.1.1(1) through R804.3.1.1(8). When determining the size of ceiling joists, the lateral support of the top flange shall be classified as unbraced, braced at mid-span or braced at third points in accordance with Section R804.3.1.4. Where sheathing material is attached to the top flange of ceiling joists or where the bracing is spaced closer than third point of the joists, the "third point" values from Tables R804.3.1.1(1) through R804.3.1.1(8) shall be used. Ceiling joists shall have a bearing support length of not less than 11/2 inches (38 mm) and shall be connected to roof rafters (heel joint) with No. 10 screws in accordance with Figures R804.3.1.1(1) and R804.3.1.1(2) and Table 804.3.1.1(9). When continuous joists are framed across interior bearing supports, the interior bearing supports shall be located within 24 inches (610 mm) of midspan of the ceiling joist, and the individual spans shall not exceed the applicable spans in Tables R804.3.1.1(2), R804.3.1.1(4), R804.3.1.1(6) and R804.3.1.1(8). When the *attic* is to be used as an *occupied space,* the ceiling joists shall be designed in accordance with Section R505.

R806.1 Ventilation required. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow.

R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented *attic* assemblies (spaces between the ceiling joists of the top *story* and the roof rafters) and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:

1. The unvented *attic* space is completely contained within the *building thermal envelope.*

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an *attic* access opening to *attic* areas that exceed 30 square feet (2.8 m2) and have a vertical height of 30 inches (762 mm) or greater. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members. The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics.*

R1006.2 Exterior air intake. The exterior air intake shall be capable of supplying all *combustion air* from the exterior of the *dwelling* or from spaces within the *dwelling* ventilated with outside air such as nonmechanically ventilated crawl or *attic* spaces. The exterior air intake shall not be located within the garage or *basement* of the *dwelling* nor shall the air intake be located at an elevation higher than the firebox. The exterior air intake shall be covered with a corrosion-resistant screen of 1/4-inch (6 mm) mesh.

M1305.1.3 Appliances in attics. *Attics* containing *appliances* shall be provided with an opening and a clear and unobstructed passageway large enough to allow removal of the largest *appliance*, but not less than 30 inches (762 mm) high and 22 inches (559 mm) wide and not more than 20 feet (6096 mm) long measured along the centerline of the passageway from the opening to the *appliance*. The passageway shall have continuous solid flooring in accordance with Chapter 5 not less than 24 inches (610 mm) wide. A level service space at least 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present along all sides of the *appliance* where access is required. The clear access opening dimensions shall be a minimum of 20 inches by 30 inches (508 mm by 762 mm), and large enough to allow removal of the largest appliance.

RB12-13

Final Action: AS AM AMPC____ D

RB23-13
R202

Proposed Change as Submitted

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Add new definition as follows:

R202
DEFINITIONS

IMPACT PROTECTIVE SYSTEM: Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached, or locked over exterior glazing.

Reason: Definition is added as companion to proposed change to Section R105.1 adding impact protective systems to the permitting requirements of the code. The definition is taken from ASCE 7-10 to assure consistency.

Cost Impact: The proposal is to add a definition and will have no cost.

Staff Analysis: Mr. Belcher has a companion change for a new Section 614 that has criteria for impact protective systems. Requirements for these types of systems are in the IRC in Section R301.2.1.2 and R612.6.

R202 IMPACT PROTECTIVE SYSTEM (NEW)-RB-BELCHER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This definition is not needed since the term is not used in the IRC. Also, there are alternate means other than testing that could be used.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Joseph D. Belcher, JDB Code Services, Inc., representing International Hurricane Protection Association (IHPA), requests Approval as Submitted.

Commenter's Reason: Impact protective systems are one means for complying with code requirements for opening protection in wind-borne debris regions. The code does not contain a definition for this important element in providing wind resistance in hurricane conditions. Both ASTM 1996 and ASCE 7-10 define Impact Protective System and the definition should be in the code to assure compliance. The definition is added as a companion to proposed change to Section R 105.1 (RB5-13) adding impact protective systems to the permitting requirements of the code. The definition is taken from ASCE 7-10 to assure consistency and because the ASCE definition indicates the requirement for testing.

RB23-13
Final Action: AS AM AMPC____ D

RB30-13
R202 (New)

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., representing National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Add new text as follows:

R202
DEFINITIONS

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide for drainage via gravity and moisture control.

Reason: The purpose of this code change is to introduce to the IRC a definition for "shingle fashion". This term is used in the IBC and IRC to describe the required method of applying moisture control layers such as roof underlayment and water-resistive barriers to the building. The intent is to direct the builder, contractor or installer to place upper layers of material lapping over lower layers of material, in the fashion of placing roof shingles, so moisture is provided with a clear path to drain down and away from the building. In field investigations of buildings with mold and moisture issues, it is frequently discovered that flashing, WRBs or underlayment have been placed in ***reverse*** shingle fashion, with the upper layer tucked behind the lower layer. This permits moisture to drain behind or below the intended protective layer or material where it can be trapped and lead to mold and decay of building components. The above definition was approved earlier this cycle (G21-12) for inclusion in the 2015 IBC.

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

R202-SHINGLE FASHION (NEW)-RB-EHRLICH

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide ~~for~~ drainage and protect against water intrusion at unsealed penetrations and joints or in combination with sealed joints ~~via gravity and moisture control~~.

Committee Reason: This adds a needed and important definition. This is consistent with the action for the IBC in Group A. The modification clarifies what the method is protecting against.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Theresa A. Weston, PhD., representing DuPont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide for drainage and protect against water intrusion at penetrations and joints ~~via gravity and moisture control.~~

Commenter's Reason: This modification simplifies the definition approved as modified by the committee. It does not need to be stated explicitly that shingle fashion can pertain to either sealed or unsealed joints as there are no other type of joint and this can be more simply stated as just "penetrations and joints" alone.

RB30-13

Final Action: AS AM AMPC____ D

RB38-13

Table R301.2(1)

Proposed Change as Submitted

Proponent: Matthew L. Mlakar, Barrish Pelham & Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Wind-borne debris zone[m]	

(Portions of table not shown to remain unchanged.)

a through k *(No changes to text)*

l. In accordance with Table R301.2(4)B, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

m. In accordance with Table R301.2(4)C, the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

Reason: Currently, the special wind regions in Table R301.2(4)B and the wind-borne debris regions in Table R301.2(4)C are shown on a single map for the entire continental United States. Attempting to interpret the map in areas where the contour lines occur can be difficult and may lead to mis-application of the tables especially since the contour lines do not follow county lines or readily identifiable borders. The identification of the transitions should be provided by the local *jurisdiction* to ensure that the proper coefficients are used.

Cost Impact: The proposed change will not impact the cost of construction.

R301.2(1)T-RB-MLAKAR

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because of potential conflicts if proposal RB39 does not pass at the Public Comment Hearings.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Matthew L. Mlakar, Barrish Pelham & Associates, representing Structural Engineers Association of California, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Wind-borne debris zone[m]	

(Portions of table and footnote not shown remain unchanged)

l. In accordance with ~~TableR301.2(4)B~~ FigureR301.2(4)A, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.
m. In accordance with ~~TableR301.2(4)C~~ SectionR301.2.1.2.1, the jurisdiction shall indicate the wind- borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

Commenter's Reason: The Committee's reasoning for disapproval during the hearing was that this code change proposal could cause potential conflicts if RB39 does not pass at the Public Comment Hearings. With the passage of the RB39 by the Committee and certain passage during the Public Comment Hearings, the inclusion of this proposal as amended by the Public Comment will provide clarity and needed direction to the user of the International Residential Code. The proposal requires the Authority Having Jurisdiction to include Special Wind Region Requirements and Wind-borne debris zone information into the Design Criteria table.

While these design requirements do not apply to most of the United States, when they are applicable they can have a major impact on the design and construction of the residential structure. With the passage of RB39 (and also in the current wind maps), the special wind regions in Figures R301.2(4)A and B are shown on a single map for the entire continental United States. Attempting to interpret the map in areas where the contour lines occur can be difficult and may lead to mis-application of the tables especially since the contour lines do not follow county lines or readily identifiable borders. The identification of the transitions should be provided by the local jurisdiction to ensure that the proper coefficients are used. It is important that these requirements be properly identified so as to be included in the construction requirements where applicable.

If there are uncertainties in the border location, then the Special Wind Requirements may be applied to locations where the requirements are not warranted. This can potentially drive up the cost of construction for sites adjacent to the Special Wind Regions.

RB38-13

Final Action: AS AM AMPC____ D

RB39-13

R202, R301.2.1, R301.2.1.1, R301.2.1.2, R301.2.1.2.1 (New), R301.2.1.3, R301.2.1.4, Table R301.2(2), Table R301.2(4)A, Table R301.2(4)B, Table R301.2(4)C, Table R301.2.1.2, Table R301.2.1.3, Table R301.2.1.5.1, Table R301.2(2), Table 301.7, Figure R301.2(4)A (New), Figure R301.2(4)B, Figure R301.2(4)C, Figure R301.2(7)

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB);

Revise definitions as follows:

SECTION R202
DEFINITIONS

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the, ultimate design wind speed, *V_{ult}*~~,~~ ~~basic wind speed~~ is greater than 115 ~~90~~ miles per hour (51~~40~~ m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands, and America Samoa.

WIND-BORNE DEBRIS REGION. Areas within *hurricane-prone regions* located ~~as designated in accordance with Figure R302.1(4)C.~~ :

1. Within 1 mile (1.61 km) of the coastal mean high water line where the ultimate design wind speed, V_{ult} is 130 mph (58 m/s) or greater; or
2. In areas where the ultimate design wind speed, V_{ult} is 140 mph (63.6 m/s) or greater; or Hawaii.

Revise as follows:

R301.2.1 Wind design criteria. Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design ~~basic~~ wind speed in Table R301.2(1) as determined from Figure R301.2(4)A. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11.1 from the roof assembly to the foundation.

R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed from Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~.

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R611.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R613.

In regions where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed shown on Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AF&PA *Wood Frame Construction Manual* (WFCM); or
2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600); or
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7); or
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230); or
5. *International Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code. When ASCE 7 or the *International Building Code* is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *International Building Code* shall be used.

~~TABLE R301.2(2)~~
~~COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)~~

~~FIGURE R301.2(4)A~~
~~BASIC WIND SPEEDS~~

~~FIGURE R301.2(4)B~~
~~REGIONS WHERE WIND DESIGN IS REQUIRED~~

~~FIGURE R301.2(4)C~~
~~WIND-BORNE DEBRIS REGIONS~~

R301.2.1.2 Protection of openings. Exterior glazing in buildings located in windborne debris regions shall be protected from windborne debris. Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E 1996 and ASTM E 1886 as modified in Section R301.2.1.2.1 ~~referenced therein~~. ~~The applicable wind zones for establishing missile types in ASTM E 1996 are shown on Figure R301.2(4)C.~~ Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact-resisting standard or ANSI/DASMA 115.

> **Exception:** Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut and attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the component and cladding loads determined in accordance with either Table R301.2(2) or ASCE 7, with the permanent corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 is permitted for buildings with a mean roof height of 45 ~~33~~ feet (10 058 mm) or less where the ultimate design wind speed, V_{ult} is 180 mph or less. ~~located in Wind Zones 1 and 2 in accordance with Figure R301.2(4)C~~.

TABLE R301.2.1.2
WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS[a,b,c,d]

a. This table is based on ~~130~~ 180 mph ultimate design wind speeds, V_{ult} and a 45 ~~33~~-foot mean roof height.

(Table and footnotes not shown to remain unchanged.)

R301.2.1.2.1. Application of ASTM E 1996. The text of Section 2.2 of ASTM E 1996 shall be substituted as follows:

> 2.2 *ASCE Standard:*

ASCE 7-10 American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures
The text of Section 6.2.2 of ASTM E 1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the strength design wind speed, V_{ult}, as follows:

6.2.2.1 *Wind Zone 1*—130 mph ≤ ultimate design wind speed, V_{ult} < 140 mph.

6.2.2.2 *Wind Zone 2*—140 mph ≤ ultimate design wind speed, V_{ult} < 150 mph at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 *Wind Zone 3*—150 mph (58 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 160 mph (63 m/s), or 140 mph (54 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 160 mph (63 m/s) and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 *Wind Zone 4*— ultimate design wind speed, V_{ult} >160 mph (63 m/s).

R301.2.1.3 Wind speed conversion. When referenced documents are based on nominal design ~~fastest mile~~ wind speeds, the ultimate design ~~three-second gust basic~~ wind speeds, V_{ult} ~~V_{3s}~~, of Figure R301.2(4)A shall be converted to nominal design ~~fastest mile~~ wind speeds, V_{asd} ~~V_{fm}~~, using Table R301.2.1.3.

~~**TABLE R301.2.1.3**~~
~~**EQUIVALENT BASIC WIND SPEEDS**~~

TABLE R301.2.1.3
WIND SPEED CONVERSIONS[a]

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155

a. Linear interpolation is permitted

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, townhouses or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. ~~Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater.~~

~~Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.~~

1~~2~~. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.

2~~3~~. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat, open country and grasslands.

3~~4~~. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water for a distance of at least 5000 feet (1,524 m) ~~1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and Alaska~~. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 600 feet (183 m) ~~1500 feet (457 m)~~ or 20 ~~10~~ times the height of the building or structure, whichever is greater. This category includes smooth mud flats, salt flats and unbroken ice.

~~TABLE R301.2.1.5.1~~
~~BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT~~

TABLE R301.2.1.5.1
BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT[a]

BASIC WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF HILL, RIDGE OR ESCARPMENT (percent)						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25
	Required Basic Wind Speed, Modified for Topographic Wind Speed-Up (rounded)						
110	132	137	142	147	152	158	162
115	138	143	148	154	159	165	169
120	144	149	155	160	166	172	176
130	156	162	168	174	179	N/A	N/A
140	168	174	181	N/A	N/A	N/A	N/A
150	180	N/A	N/A	N/A	N/A	N/A	N/A

a. Table applies to a feature height of 500 feet or less and dwellings sited a distance equal or greater than half the feature height.

TABLE R301.2(2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (ASD)(psf)[a, b, c, d, e]

	ZONE	EFFECTIVE WIND AREA (feet2)	ULTIMATE DESIGN WIND SPEED, V_{ULT} (mph)																	
			110		115		120		130		140		150		160		170		180	
Roof 0 to 7 degrees	1	10	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-35.0
	1	20	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.2	-	10.6	-	11.9	-	13.3	34.1
	1	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	8.5	-	10.0	-	10.8	-	12.2	-32.9
	1	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	7.8	-	10.0	-	10.0	-	11.3	-32.0
	2	10	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-58.7
	2	20	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.2	-	10.6	-	11.9	-	13.3	-52.4
	2	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	8.5	-	10.0	-	10.8	-	12.2	-44.1
	2	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	7.8	-	10.0	-	10.0	-	11.3	-37.9
	3	10	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-88.3
	3	20	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.2	-	10.6	-	11.9	-	13.3	-73.1
	3	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	8.5	-	10.0	-	10.8	-	12.2	-53.1
	3	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	7.8	-	10.0	-	10.0	-	11.3	-37.9

	ZONE	EFFECTIVE WIND AREA (feet2)	ULTIMATE DESIGN WIND SPEED, V_{ULT} (mph)																	
			110		115		120		130		140		150		160		170		180	
Roof > 7 to 27 degrees	1	10	10.0	-	10.0	-	10.0	-	10.5	-	12.2	-	14.0	-	15.9	-	17.9	-	20.2	-32.0
	1	20	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.8	-	14.5	-	16.4	-	18.4	-31.1
	1	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.7	-	14.3	-	16.0	-29.9
	1	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-29.0
	2	10	10.0	-	10.0	-	10.0	-	10.5	-	12.2	-	14.0	-	15.9	-	17.9	-	20.2	-55.8
	2	20	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.8	-	14.5	-	16.4	-	18.4	-51.2
	2	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.7	-	14.3	-	16.0	-45.4
	2	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-40.9
	3	10	10.0	-	10.0	-	10.0	-	10.5	-	12.2	-	14.0	-	15.9	-	17.9	-	20.2	-82.4
	3	20	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.8	-	14.5	-	16.4	-	18.4	-77.0
	3	50	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	11.1	-	12.7	-	14.3	-	16.0	-69.9
	3	100	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	9.9	-	11.2	-	12.6	-	14.2	-64.6
Roof > 27 to 45 degrees	1	10	11.9	-	13.1	-	14.2	-	16.7	-	19.4	-	22.2	-	25.3	-	28.5	-	32.0	-35.0
	1	20	11.6	-	12.7	-	13.8	-	16.2	-	18.8	-	21.6	-	24.6	-	27.7	-	31.1	-33.2
	1	50	11.2	-	12.2	-	13.3	-	15.6	-	18.1	-	20.8	-	23.6	-	26.7	-	29.9	-30.8
	1	100	10.9	-	11.9	-	12.9	-	15.1	-	17.6	-	20.2	-	22.9	-	25.9	-	29.0	-29.0
	2	10	11.9	-	13.1	-	14.2	-	16.7	-	19.4	-	22.2	-	25.3	-	28.5	-	32.0	-40.9
	2	20	11.6	-	12.7	-	13.8	-	16.2	-	18.8	-	21.6	-	24.6	-	27.7	-	31.1	-39.1
	2	50	11.2	-	12.2	-	13.3	-	15.6	-	18.1	-	20.8	-	23.6	-	26.7	-	29.9	-36.8
	2	100	10.9	-	11.9	-	12.9	-	15.1	-	17.6	-	20.2	-	22.9	-	25.9	-	29.0	-35.0
	3	10	11.9	-	13.1	-	14.2	-	16.7	-	19.4	-	22.2	-	25.3	-	28.5	-	32.0	-40.9
	3	20	11.6	-	12.7	-	13.8	-	16.2	-	18.8	-	21.6	-	24.6	-	27.7	-	31.1	-39.1
	3	50	11.2	-	12.2	-	13.3	-	15.6	-	18.1	-	20.8	-	23.6	-	26.7	-	29.9	-36.8
	3	100	10.9	-	11.9	-	12.9	-	15.1	-	17.6	-	20.2	-	22.9	-	25.9	-	29.0	-35.0
Wall	4	10	13.1	-	14.3	-	15.5	-	18.2	-	21.2	-	24.3	-	27.7	-	31.2	-	35.0	-37.9
	4	20	12.5	-	13.6	-	14.8	-	17.4	-	20.2	-	23.2	-	26.4	-	29.7	-	33.4	-36.4
	4	50	11.7	-	12.8	-	13.9	-	16.3	-	19.0	-	21.7	-	24.7	-	27.9	-	31.3	-34.3
	4	100	11.1	-	12.1	-	13.2	-	15.5	-	18.0	-	20.6	-	23.5	-	26.5	-	29.8	-32.7
	4	500	10.0	-	10.6	-	11.6	-	13.6	-	15.8	-	18.1	-	20.6	-	23.2	-	26.1	-29.0
	5	10	13.1	-	14.3	-	15.5	-	18.2	-	21.2	-	24.3	-	27.7	-	31.2	-	35.0	-46.8
	5	20	12.5	-	13.6	-	14.8	-	17.4	-	20.2	-	23.2	-	26.4	-	29.7	-	33.4	-43.7
	5	50	11.7	-	12.8	-	13.9	-	16.3	-	19.0	-	21.7	-	24.7	-	27.9	-	31.3	-39.5
	5	100	11.1	-	12.1	-	13.2	-	15.5	-	18.0	-	20.6	-	23.5	-	26.5	-	29.8	-36.4
	5	500	10.0	-	10.6	-	11.6	-	13.6	-	15.8	-	18.1	-	20.6	-	23.2	-	26.1	-29.0

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

Notes:

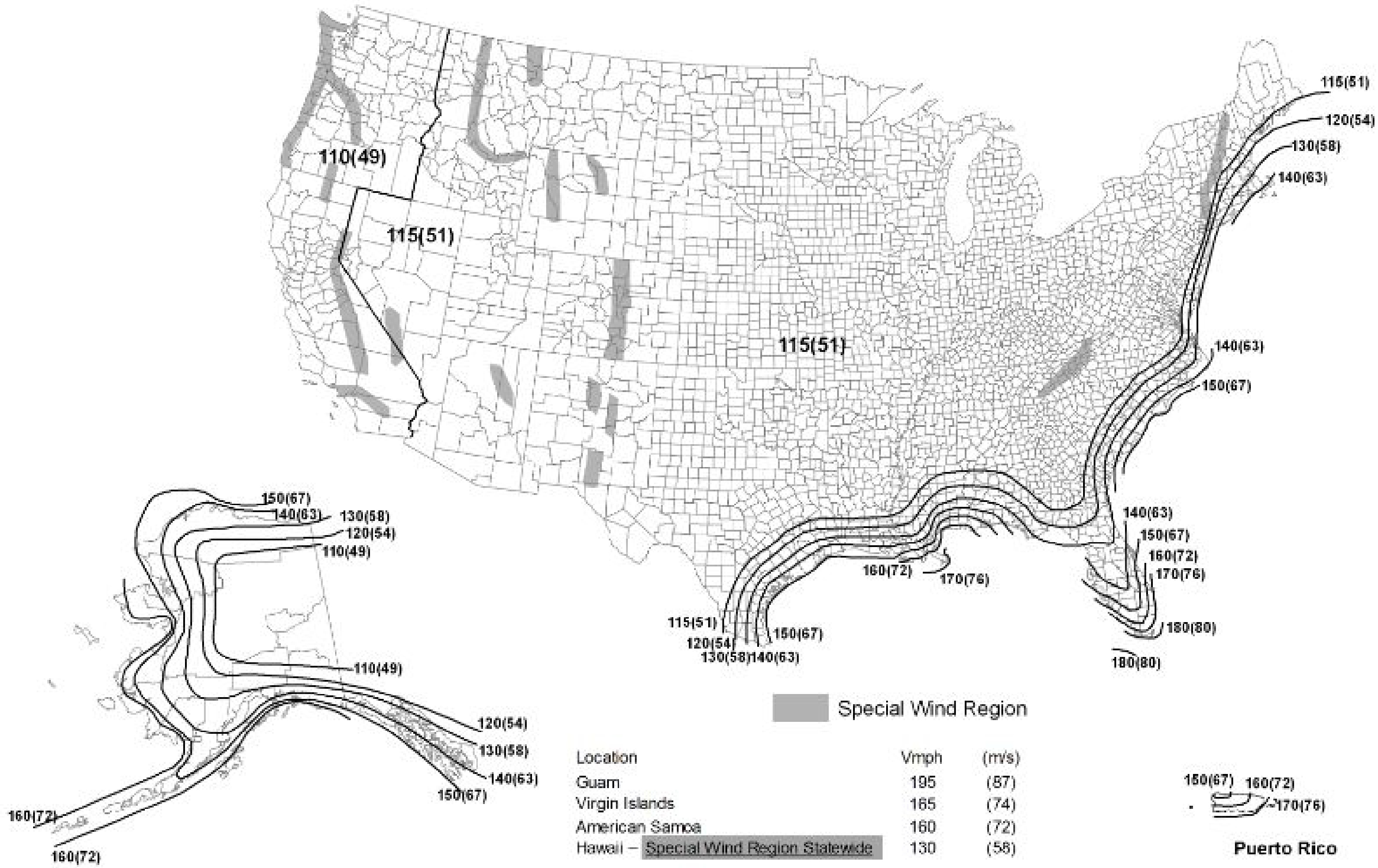
a. The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.

b. For effective areas between those given above, the load may be interpolated; otherwise, use the load associated with the lower effective area.

c. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).

d. See Figure R301.2(7) for location of zones.

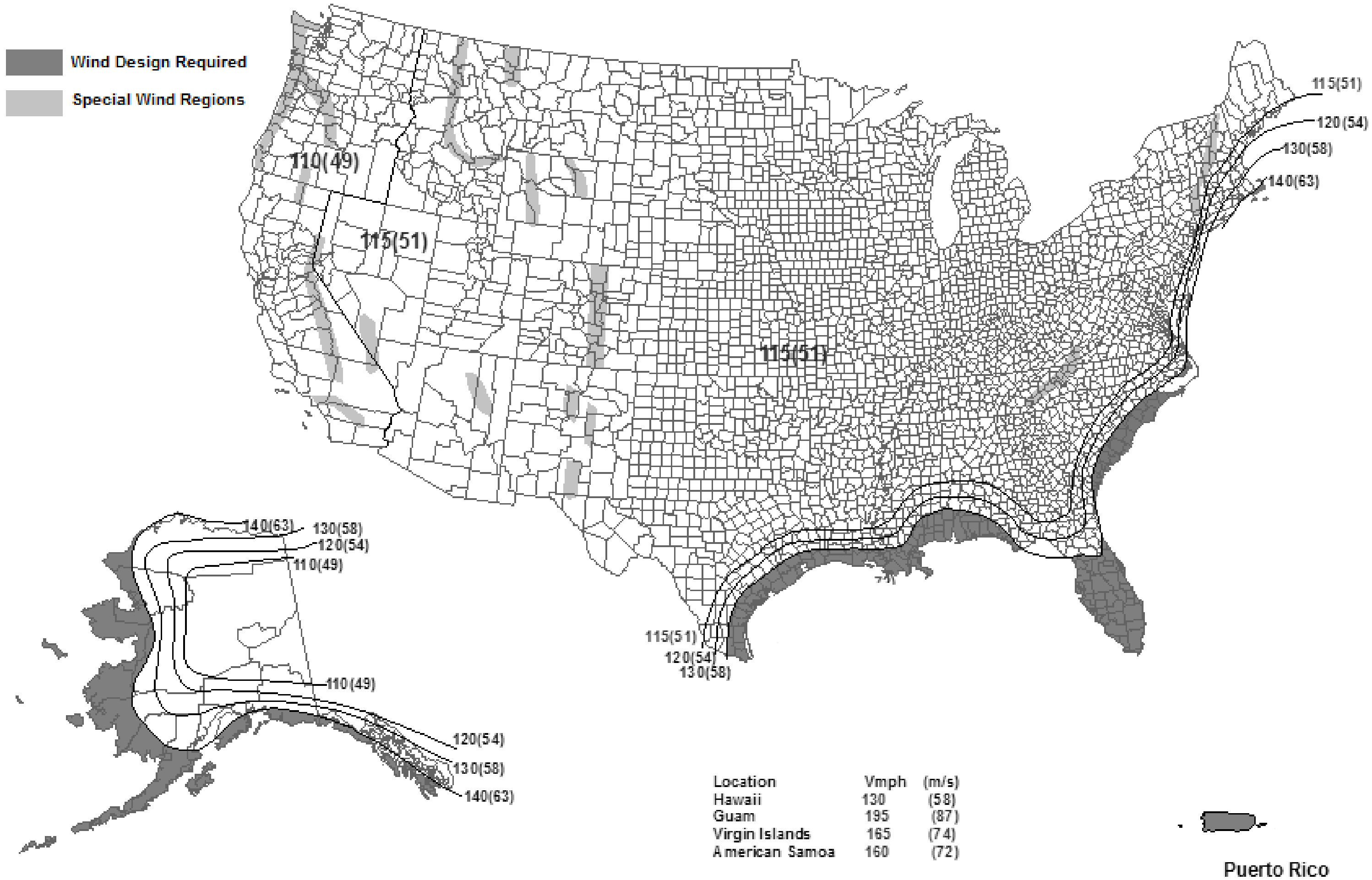
e. Plus and minus signs signify pressures acting toward and away from the building surfaces.



Location	Vmph	(m/s)
Guam	195	(87)
Virgin Islands	165	(74)
American Samoa	160	(72)
Hawaii – Special Wind Region Statewide	130	(58)

Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

FIGURE R301.2(4)A
ULTIMATE DESIGN WIND SPEEDS



Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years.

FIGURE R301.2(4)B
REGIONS WHERE WIND DESIGN IS REQUIRED

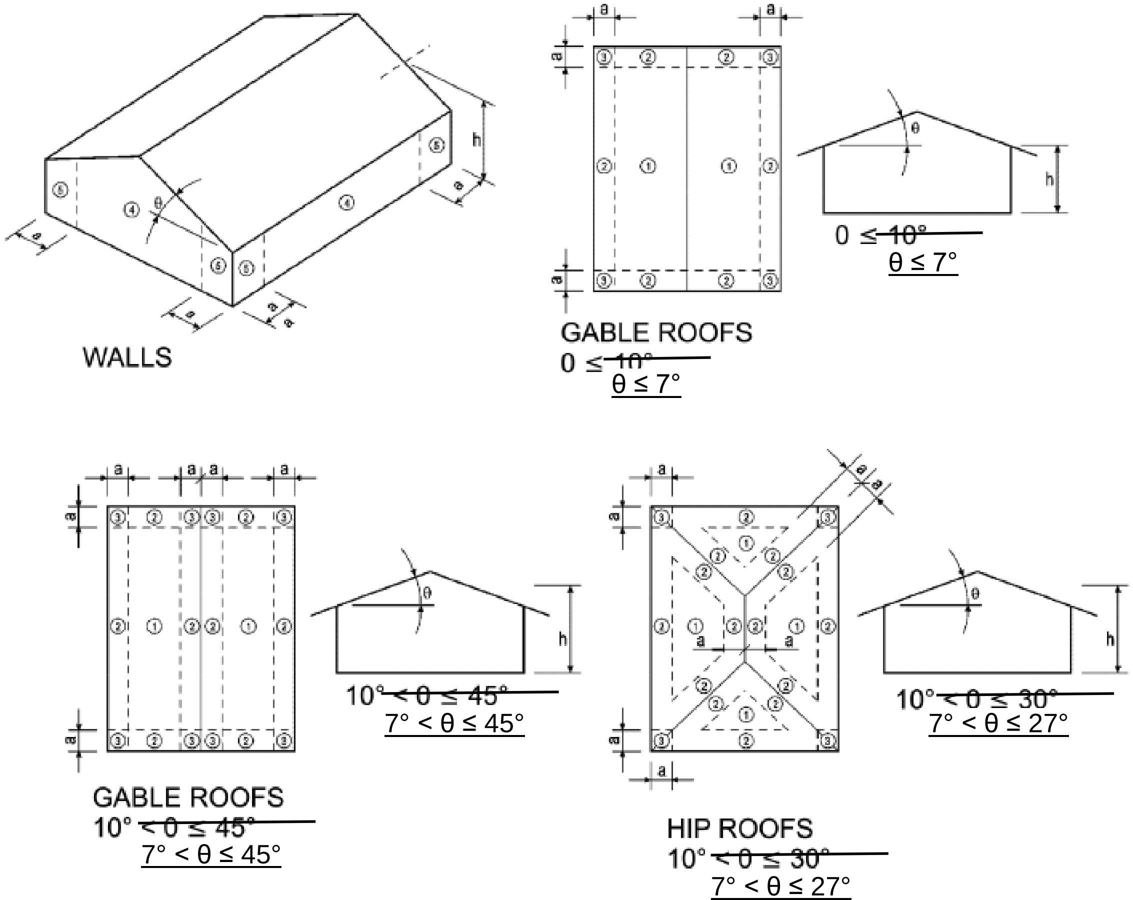


FIGURE R301.2(7)
COMPONENT AND CLADDING PRESSURE ZONES

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[a, b, c, d, e]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Exterior walls[a] ~~—wind loads[a]~~ with plaster or stucco finish	H/360
Exterior walls[a] with other brittle finishes	H/240
Exterior walls[a] with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: L = span length, H = span height.

a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding (ASD) loads obtained from Table R301.2(2) for the purpose of determining deflection limits herein.

(Footnotes not shown to remain unchanged.)

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle changes, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates the Chapter 3 design criteria, including definitions, a new ultimate wind speed map, a new map of the regions where special high-wind design is required, a conversion table to the nominal (ASD) wind speed basis for use with those standards which have not updated their provisions, and a revised table of component and cladding pressures.

It is noted the component and cladding pressure table is set up using the ultimate design wind speed, but reports pressures at an ASD level. That is, the listed pressures incorporate the 0.6 multiplier on wind loads per the allowable stress design load combinations shown in Section 1605.3 of the *International Building Code* and Section 2.3.2 of ASCE 7-10. This is done here and throughout this series of proposals to allow for easy adaptation of existing stock designs, construction documents and guidelines to the 2015 IRC, as the loads and pressures will be comparable to previous editions of the IRC for most sites.

The region in revised Figure R301.2(4)B where the use of alternate prescriptive high-wind standards or engineered design is required is defined using the 130mph contour along the Gulf Coast and along the southern portions of the Atlantic coast from Florida up to North Carolina. The 140mph contour is used for the northern portions of the Atlantic coast from Virginia up to Maine, and for Alaska. A 130mph trigger is also used for the assorted Caribbean and Pacific islands that are also considered part of the "hurricane-prone" region. This creates a region that approximately equals the region defined by the 110mph contour under the wind map used in the 2000 through 2009 IRC, maintains areas of Florida and the Gulf Coast traditionally outside of the prescriptive limits of the IRC, and maintains areas of New England traditionally included within the prescriptive limits of the IRC.

Code users desiring a more accurate determination in areas near or along a particular contour (or in general) can make use of the Applied Technology Council's Windspeed by Location web site (http://www.atcouncil.org/windspeed/) to obtain site-specific wind speeds using latitude/longitude or site address. This site was developed by ATC using the same data used to develop the wind maps for ASCE 7, the IBC and the IRC. As the site is not a reference standard or maintained by a government agency, we could not make a direct reference in the code figures. However, we include mention of the Windspeed by Location web site here to draw code users' attention to its existence and in hopes that mention of the web site could become part of the IRC Commentary.

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

R301.2.1-RB-EHRLICH

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: Approved as Submitted

Committee Reason: The committee approved this proposed code change because they felt that it creates consistency between the International Codes and ASCE 7.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary J Ehrlich, P.E., representing National Association of Home Builders (NAHB); Joseph D. Belcher, JDB Code Services Inc., representing the International Hurricane Protection Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.2.1 Application of ASTM E 1996. The text of Section 2.2 of ASTM E 1996 shall be substituted as follows:

2.2 *ASCE Standard:*
ASCE 7-10 American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures

The text of Section 6.2.2 of ASTM E 1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the ultimate ~~strength~~ design wind speed, V_{ult}, as follows:

6.2.2.1 *Wind Zone 1*—130 mph ≤ ultimate design wind speed, V_{ult} < 140 mph.

6.2.2.2 *Wind Zone 2*—140 mph ≤ ultimate design wind speed, V_{ult} < 150 mph at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 *Wind Zone 3*—150 mph (58 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 170 ~~160~~ mph (76~~63~~ m/s), or 140 mph (54 m/s) ≤ ultimate design wind speed, V_{ult} ≤ 170 ~~160~~ mph (76~~63~~ m/s) and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 *Wind Zone 4*— ultimate design wind speed, V_{ult} > 170 ~~160~~ mph (63 m/s).

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this public comment is to amend the definition for Wind Zone 4 in ASTM E1996. The original intent of Wind Zone 4 was to address higher requirements for impact-resistant glazing and impact-resistive systems in Miami-Dade County only. When similar language was added to the IBC last cycle to amend ASTM E1996 to work with ultimate design wind speeds, a direct conversion of the previous trigger was made. It was not realized until Florida was in the process of adopting the 2012 IBC that this had the effect of extending Wind Zone 4 north into Broward, Palm Beach, Martin and St. Lucie counties where it had not previously applied and was not intended to apply. The result is a potential increase of $2424 to $4248 for wind-borne debris protection of residential buildings in those counties.

The Florida Building Code was amended to correct the inadvertent extension of Wind Zone 4. The IHPA attempted a floor modification at the Committee Action Hearing which NAHB was prepared to support, but was ruled out of order by the moderator. This public comment advances the proposed modification and fixes the unintended consequences of the original ASTM E1996 amendment.

One editorial change is also made to correct "strength design wind speed" to "ultimate design wind speed" to correlate with the remainder of the IRC wind update proposals.

Public Comment 2:

Gary J Ehrlich, P.E., representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, townhouses or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
2. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat, open country and grasslands.
3. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water, smooth mud flats, salt flats or unbroken ice for a distance of at least 5000 feet (1,524 m). This exposure shall also apply ~~only~~ to any ~~those~~ building~~s~~ located within Exposure B or C type terrain where the site is within ~~and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of~~ 600 feet (183 m) or 20 times the height of the building ~~or structure~~, whichever is greater from an Exposure D condition. ~~This category includes smooth mud flats, salt flats and unbroken ice~~.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this public comment is to better correlate the definition of Exposure D with ASCE 7-10. The language proposed here is similar in concept to language proposed by SEAOC in RB45, but with better clarity. NAHB had worked with SEAOC to develop this language as a floor modification to RB39, but the modification was ruled out of order. A correlating public comment has been submitted for disapproval of RB45 if this public comment is approved.

Public Comment 3:

Gary J Ehrlich, P.E., representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.2.1.5.1
~~BASIC~~ ULTIMATE DESIGN WIND SPEED MODIFICATION FOR TOPOGRAPHIC WIND EFFECT[a]

~~BASIC~~ ULTIMATE DESIGN WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF HILL, RIDGE OR ESCARPMENT (percent)						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25
	Required Ultimate Design ~~Basic~~ Wind Speed, Modified for Topographic Wind Speed-Up (rounded)						
110	132	137	142	147	152	158	162
115	138	143	148	154	159	165	169
120	144	149	155	160	166	172	176
130	156	162	168	174	179	N/A	N/A
140	168	174	181	N/A	N/A	N/A	N/A
150	180	N/A	N/A	N/A	N/A	N/A	N/A

a. Table applies to a feature height of 500 feet or less and dwellings sited a distance equal or greater than half the feature height.
b. Where the ultimate design wind speed as modified by Table R301.2.1.5.1 equals or exceeds 140mph, the building shall be considered as "wind design required" in accordance with Section R301.2.1.1

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[a, b, c, d, e]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Exterior walls - wind loads[a] with plaster or stucco finish	H/360
Exterior walls - wind loads[a] with other brittle finishes	H/240
Exterior walls - wind loads[a] with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: L = span length, H = span height.
a The wind load shall be permitted to be taken as 0.7 times the Component and Cladding (ASD) loads obtained from Table R301.2(2) for the purpose of determining deflection limits herein.
b. (No changes)
c. (No changes)
d. (No changes)
e. (No changes)

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this public comment is to insure the comprehensive Chapter 3 wind update is internally consistent with terminology and to correlate RB39 with other proposals.

In developing RB39, the wind speeds in Table R301.2.1.5.1, which provides simplified adjustments to wind speed for topographic effects, were updated to the new ultimate design wind speed basis. However, the term "basic wind speed" in the table was not changed to "ultimate design wind speed" as is done throughout the rest of the wind update (and in the 2012 IBC). This public comment picks up the change in terminology. A new footnote is also provided to clarify when the topographic wind effects make the site a "wind design required" region where use of the alternate standards (ICC-600, WFCM, AISI 230, etc.) are required.

The change to table R301.7 correlates RB39 with RB62, both of which were approved by the IRC Building Committee. As it stands, the committee actions would result in "wind loads" being deleted from the first exterior wall condition (plaster or stucco finish) but added to the other two conditions (brittle finishes and flexible finishes). This change will correlate the two proposals by insuring the "wind loads" language appears for all three conditions

Public Comment 4:

Bonnie Manley, American Iron and Steel Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.3 Wind speed conversion. When referenced documents are based on nominal design wind speeds and do not provide the means for conversion between the ultimate design wind speeds and the nominal design wind speeds, the ultimate design wind speeds, V_{ult}, of Figure R301.2(4)A shall be converted to nominal design wind speeds, V_{asd} using Table R301.2.1.3.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this comment is to ensure that the conversion table, Table R301.2.1.3, does not override Table A1-3 of AISI S230-07 w/S3-12, as follows:

Table A1-3
Conversion of ASCE 7 Basic Wind Speeds to AISI S230 Basic Wind Speeds (mph) [1]

ASCE 7 Basic Wind Speed	110	115	126	139	152	164	177	190
AISI S230 Basic Wind Speed	85	90	100	110	120	130	140	150

[1] ASCE 7 permits linear interpolation between the contours of the basic wind speed maps.

This table is based upon ASCE 7-10 Table C26.5-6 and provides a direct conversion between the wind speeds, where V_{ult} is effectively listed as the row titled "ASCE 7 Basic Wind Speed" and V_{asd} is effectively listed as the row titled "AISI S230 Basic Wind Speed." This differs slightly from the conversion incorporated into Proposal RB39. However, for the purposes of cold-formed steel framing, it is important that the conversion process remains consistent between the IRC and AISI S230. Therefore, it is necessary to introduce a qualifier to the charging language in section R301.2.1.3 that recognizes that reference documents may include conversion tables of their own.

Public Comment 5:

Bonnie Manley, American Iron and Steel Institute, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B.

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R611.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R613.
3. For cold-formed steel light frame construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R505, R603 and R804.

In regions where wind design is required in accordance with Figure R301.2(4)B, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AF&PA *Wood Frame Construction Manual (WFCM)*; or
2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600); or
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7); or
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230); or
5. *International Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code. When ASCE 7 or the International Building Code is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *International Building Code* shall be used.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: The purpose of this comment is to ensure that the IRC wind design applicability limits for cold-formed steel light frame construction remain consistent with AISI S230-07 w/S3-12. AISI developed AISI S230-07 w/S3-12 to allow the 2007 edition of AISI S230 to be used in conjunction with the 2010 edition of ASCE 7. AISI S230-07 w/S3-13 incorporates the following conversion table:

Table A1-3
Conversion of ASCE 7 Basic Wind Speeds to AISI S230 Basic Wind Speeds (mph) [1]

ASCE 7 Basic Wind Speed	110	115	126	139	152	164	177	190
AISI S230 Basic Wind Speed	85	90	100	110	120	130	140	150

[1] ASCE 7 permits linear interpolation between the contours of the basic wind speed maps.

This table is based upon ASCE 7-10 Table C26.5-6 and provides a direct conversion between the wind speeds, which differs slightly from the conversion incorporated into Proposal RB39. Specifically, AISI has chosen to convert the ASCE 7-05 design wind speed ("AISI S230 Basic Wind Speed" in Table A1-3) of 110 mph to 139 mph instead of 140 mph. Since this particular wind speed is often a trigger for additional requirements, it is important that it remains consistent throughout the IRC – in Sections R301, R505, R603 and R804 – and AISI S230. Therefore, it is necessary to introduce an exception to Section R301.2.1.1 for cold-formed steel light frame construction similar to the ones in place for concrete and structural insulated panels.

RB39-13

Final Action: AS AM AMPC____ D

RB40-13
R301.2.1.1.1 (New), Chapter 44

<u>Proposed Change as Submitted</u>

Proponent: Julie Ruth, P.E., JRuth Code Consulting, representing the American Architectural Manufacturers Association (julruth@aol.com); Daniel J. Walker, P.E., Thomas Associates, representing the National Sunroom Association

Add new text as follows:

<u>**R301.2.1.1.1 Sunrooms.** Sunrooms shall comply with the wind loads, structural requirements and testing provisions of Section 5.2.1 of AAMA/NPEA/NSA 2100, with the following modifications:</u>

1. <u>Basic wind speed in miles per hour (mph) shall be determined in accordance with Section R301.2.1 of this code; and</u>
2. <u>Sunrooms including exposed structure, components, cladding, and roof covering shall be designed to resist the wind loads as established in Section R301.2.1 of this code.</u>

<u>For the purpose of applying the criteria of AAMA/NPEA/NSA-2100 based on the intended use, sunrooms shall be identified as one of the following categories by the permit applicant, design professional or the property owner in the *construction documents*. Component and Cladding pressures shall be used for the design of elements that do not qualify as main wind force resisting systems. Main wind force resisting systems pressures shall be used for the design of elements assigned to provide support and stability for the overall *sunroom*.</u>

<u>**Category I:** A *Thermally Isolated Sunroom* with walls that are open or enclosed with insect screening or 0.5 mm (20 mil) maximum thickness plastic film. The space is nonhabitable and unconditioned.</u>

<u>**Category II:** A *Thermally Isolated Sunroom* with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The space is nonhabitable and unconditioned.</u>

<u>**Category III:** A *Thermally Isolated Sunroom* with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The sunroom fenestration complies with additional requirements for air infiltration resistance and water-penetration resistance. The space is nonhabitable and unconditioned.</u>

<u>**Category IV:** A *Thermally Isolated Sunroom* with enclosed walls. The sunroom is designed to be heated or cooled by a separate temperature control or system and is thermally isolated from the primary structure. The sunroom fenestration complies with additional requirements for water penetration resistance, air infiltration resistance, and thermal performance. The space is nonhabitable and *conditioned*.</u>

<u>**Category V:** A *Sunroom* with enclosed walls. The sunroom is designed to be heated or cooled and is open to the main structure. The sunroom fenestration complies with additional requirements for water-penetration resistance, air infiltration resistance, and thermal performance. The space is *habitable* and *conditioned*.</u>

Add standards to Chapter 44 as follows:

AAMA American Architectural Manufacturers Association
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173

AAMA/NSA/NPEA 2100-12 Specifications for Sunrooms

NSA National Sunroom Association
1300 Sumner Ave.
Cleveland, OH 44115-2851

AAMA/NSA/NPEA 2100-12 Specifications for Sunrooms

NPEA National Sunroom Association
1300 Sumner Ave.
Cleveland, OH 44115-2851

AAMA/NSA/NPEA 2100-12 Specifications for Sunrooms

Reason: The 2012 *International Residential Code* defines a sunroom as "A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof." These structures are typically constructed in one of two manners: 1) using typical wood framing techniques, or 2) using a stick system that consists of prefabricated framing of aluminum, fiberglass, wood or other materials, with glass or opaque wall or roof panels, and steel or aluminum connections.

The first technique can be done in accordance with the current provisions of the IRC for wood framed construction. There are no provisions in the IRC for the second method of constructing a sunroom other than by engineering analysis or demonstrating equivalence to the current provisions of the *International Residential Code* by some other means.

This proposal seeks to clarify the requirements for sunrooms under the IRC by adding reference to the provisions of AAMA/NPEA/NSA 2100 - 12 *Specifications for Sunrooms* to the available options for approval of sunroom construction in the IRC. Sunrooms designed and constructed in accordance with AAMA/NPEA/NSA 2100 are required within the standard to meet the structural provisions of the IRC or the IBC. Therefore, the appropriate engineering analysis has already been conducted for these structures. In addition, the standard establishes the specific requirements for these unique structures based upon their designated Category.

In 2002 the American Architectural Manufacturers Association (AAMA), the National Sunroom Association (NSA) and the National Patio Enclosure Association (NPEA) published the first U.S. standard for the design and specification of sunrooms – AAMA/NPEA/NSA 2100 – 02. The standard established five categories of sunrooms based upon the intended use of the space, and established specific design and performance criteria for them based on the end use.

As the document began to be used and referenced in various local codes (such as the Florida Building Code) the members of the AAMA Sunroom Council and NSA became aware that improvements and updates were needed. These improvements included revisions that would bring the document in line with the requirements of AAMA/WDMA/CSA 101/I.S.2/A440 for the design, testing and labeling of windows, glass doors and skylights, and revisions that would bring the foundation requirements more closely in line with the requirements of the *International Residential Code*. The most recent edition of the standard is AAMA/NPEA/NSA 2100-12. The table below provides an overview of the requirements of AAMA/NPEA/NSA 2100-12, as they apply to the various categories of sunrooms.

Minimum Requirements	**Cat. I**	**Cat. II**	**Cat. III**	**Cat. IV**	**Cat. V**
Structural Design in accordance with IRC or IBC.	x	x	x	x	x
Fenestration products comply with AAMA/WDMA/CSA 101/I.S.2/A440 (includes resistance to air leakage, water penetration, forced entry, etc. as well as structural design pressure rating).		x	x	x	x
Comply with IECC or IRC Chapter 11.				x	x
Comply with the Foundation/footings, site location, and emergency escape and rescue openings requirements of the IRC or local code.	x	x	x	x	x
Emergency escape and rescue openings are permitted to open onto sunroom.	x				
Comply with the natural lighting requirements of the IRC or local code.	x	x	x	x	x
Openings for natural lighting are permitted to open onto sunroom.	x				
Comply with the requirements of the IRC or local code for stairway and egress illumination.	x	x	x	x	x
Required to have exit lighting.		x	x	x	x
Receptacle outlets as required by NFPA 70, Article 314.				x	x

The 2002 edition of AAMA/NPEA/NSA 2100 has been used successfully in previous editions of the Florida Building Code. Reference to the 2012 edition in the 2015 IRC to facilitate its use on a nationwide basis is appropriate at this time.

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

Analysis: A review of the standard proposed for inclusion in the code, [AAMA/NSA/NPEA 2100-12] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R301.2.1.1.1 (NEW)-RB-RUTH-WALKER

Committee Action Hearing Results

For staff analysis of the content of AAMA/NSA/NPEA 2100 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because there was no provision in the proposal for non-prefabricated sun rooms.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.2.1.1.1 Sunrooms. Sunrooms shall comply with ~~the wind loads, structural requirements and testing provisions of Section 5.2.1 of~~ AAMA/NPEA/NSA 2100~~. with the following modifications:~~

1. ~~Basic wind speed in miles per hour (mph) shall be determined in accordance with Section R301.2.1 of this code; and~~
2. ~~Sunrooms including exposed structure, components, cladding, and roof covering shall be designed to resist the wind loads as established in Section R301.2.1 of this code.~~

(Portions of code change not shown remain unchanged).

Commenter's Reason: The committee disapproved the proposed reference at the Code Development Hearings in Dallas, at least in part, due to confusion regarding the scope of the document. Concern was expressed that it only applies to prefabricated sunrooms. The standard, however, is not limited to prefabricated sunrooms and the opponents who spoke against it have not identified a single reference in the standard that would limit its application. Questions regarding matters such as egress, natural lighting and ventilation, resistance to air leakage and water penetration, etc. are pertinent to both site built and prefabricated sunrooms. Addressing them does not limit the application of the standard in any way.

The design wind load requirements of the IRC were converted from allowable stress design to strength design through the approval of RB39-13 and related proposals.

The original proposal provided specific cross references to determine the appropriate design wind pressures for the sunroom. There is now confusion with regards to these cross references, due to the changes in wind speed model on Section R301.

This Public Comment removes the potential cause for concern, and simply references AAMA/NPEA/NSA 2100 for sunrooms. This is consistent with language that has been included in the Florida Building Code – Residential since the 2004 edition.

AAMA/NPEA/NSA 2100, and the 5 categories of sunrooms it established, clarifies the criteria for these types of spaces with regards to egress, natural ventilation, resistance of the exterior envelop to air leakage and water penetration, etc.

RB40-13
Final Action: AS AM AMPC____ D

RB43-13

Tables R301.2.1.2, R602.3(2), R602.3.1, R602.3(3), R602.10.1.3, R602.10.3(1), R602.10.4, R602.10.5, R602.10.6.1, R603.3.1, R603.3.2(2), R603.3.2.1(1) through (4), R603.8, R611.6(1) through (4) and R613.5(1); and Sections R505.1.1, R602.10.6.5.1, R602.10.8.2, R603.1.1, R603.9.4.1, R611.2, R613.2, R802.10.2.1, R804.1.1, R804.3.2.1, R804.3.3 and R905.3.7

Proposed Change as Submitted

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

Revise as follows:

TABLE R301.2.1.2
WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE
FOR WOOD STRUCTURAL PANELS

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.448 N,
1 mile per hour = 0.447 m/s.

a. This table is based on a 130mph basic wind speeds~~s~~ and a 33-foot mean roof height.

b through d *(No change to current text)*

Revise as follows:

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

Revise as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS[b, c, d] ~~EXPOSED TO WIND SPEEDS OF 100 mph OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D0, D1 and D2~~

(Portions of table not shown remain unchanged)

a. Design required.

b. Table is limited to buildings located where the basic wind speed is 100mph or less and for which the seismic design category is A, B, C, D0, D1, or D2

c~~b~~. Applicability of this table assumes the following: Snow load not exceeding 25 psf, *fb* not less than 1310 psi determined by multiplying the AF&PA NDS tabular base design value by the repetitive use factor, and by the size factor for all species except southern pine, E not less than 1.6 × 106 psi, tributary dimensions for floors and roofs not exceeding 6 feet, maximum span for floors and roof not exceeding 12 feet, eaves not over 2 feet in dimension and exterior sheathing. Where the conditions are not within these parameters, design is required.

d~~c~~. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE R602.3(1)

(Portions of table not shown remain unchanged)

a through f *(No change to current text)*

g. Specified alternate attachments for roof sheathing shall be permitted for basic wind speeds less than 100 mph. Fasteners attaching wood structural panel roof sheathing to gable end wall framing shall be installed using the spacing listed for panel edges.

TABLE R602.3(3)
REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES [a, b, c]

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		MAXIMUM BASIC WIND SPEED (mph)		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	Wind exposure category		
							B	C	D

(Portions of table not shown remain unchanged)

TABLE R602.10.1.3
BRACED WALL LINE SPACING

APPLICATION	CONDITION	BUILDING TYPE	BRACED WALL LINE SPACING CRITERIA	
			Maximum Spacing	Exception to Maximum Spacing
Wind bracing	Basic wind speed 85mph to 110 mph	Detached, Townhouse	60 feet	None

(Portions of table not shown remain unchanged)

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.
a through b *(No change to current text)*
c. Method CS-SFB does not apply where the basic wind speed is greater than 100 mph.

TABLE R602.10.4
BRACING METHODS

(Portions of table not shown remain unchanged)

a through c *(No change to current text)*
d. Method CS-SFB does not apply in Seismic Design Categories D0, D1 and D2 and in areas where the basic wind speed exceeds 100 mph.
e. *(No change to current text)*

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH [a] (in)					CONTRIBUTING LENGTH (in)
		Wall Height					
		8 feet	9 feet	10 feet	11 feet	12 feet	
ABW	SDC A, B and C basic wind speed < 110 mph	28	32	34	38	42	48
	SDC D_o, D_1 and D_2, basic wind speed < 110 mph	32	32	34	NP	NP	

(Portions of table not shown remain unchanged.)

TABLE R602.10.6.1
MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS

SEISMIC DESIGN CATEGORY AND WIND SPEED	SUPPORTING/STORY	HOLD DOWN FORCE (lb)				
		Height of Braced Wall Panel				
		8 ft	9 ft	10 ft	11 ft	12 ft
SDC A, B and C Basic w ~~W~~ind speed < 110 mph	One story	1800	1800	1800	2000	2200
	First of two story	3000	3000	3000	3300	3600
SDC D_0, D_1 and D_2 Basic w ~~W~~ind speed < 110 mph	One story	1800	1800	1800	NP [a]	NP [a]
	First of two story	3000	3000	3000	NP [a]	NP [a]

(Portions of table not shown remain unchanged.)

R602.10.6.5.1 Length of bracing. The length of bracing along each braced wall line shall be the greater of that required by the basic ~~design~~ wind speed and braced wall line spacing in accordance with Table R602.10.3(1) as adjusted by the factors in the Table R602.10.3(2) or the Seismic Design Category and braced wall line length in accordance with Table R602.10.6.5. Angled walls shall be permitted to be counted in accordance with Section R602.10.1.4, and braced wall panel location shall be in accordance with Section R602.10.2.2. The seismic adjustment factors in Table R602.10.3(4) shall not be applied to the length of bracing determined using Table R602.10.6.5. In no case shall the minimum total length of bracing in a braced wall line, after all adjustments have been taken, be less than 48 inches (1219 mm) total.

R602.10.8.2 Connections to roof framing. Top plates of exterior braced wall panels shall be attached to rafters or roof trusses above in accordance with Table R602.3(1) and this section. Where required by this section, blocking between rafters or roof trusses shall be attached to top plates of braced wall panels and to rafters and roof trusses in accordance with Table R602.3(1). A continuous band, rim, or header joist or roof truss parallel to the braced wall panels shall be permitted to replace the blocking required by this section. Blocking shall not be required over openings in continuously-sheathed braced wall lines. In addition to the requirements of this section, lateral support shall be provided for rafters and ceiling joists in accordance with Section R802.8 and for trusses in accordance with Section R802.10.3. Roof ventilation shall be provided in accordance with Section R806.1.

1. For Seismic Design Categories A, B and C and basic wind speeds less than 100 mph (45 m/s) where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is 91/4 inches (235 mm) or less, blocking between rafters or roof trusses shall not be required. Where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is between 91/4 inches (235 mm) and 151/4 inches (387 mm), blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
2. For Seismic Design Categories D0, D1 and D2 or basic wind speeds of 100 mph (45 m/s) or greater, where the distance from the top of the braced wall panel to the top of the rafters or roof trusses is 151/4 inches (387 mm) or less, blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
3. Where the distance from the top of the *braced wall panel* to the top of rafters or roof trusses exceeds $15^{1}/_{4}$ inches (387 mm), the top plates of the *braced wall panel* shall be connected to perpendicular rafters or roof trusses above in accordance with one or more of the following methods:
   3.1. Soffit blocking panels constructed in accordance with Figure R602.10.8.2(2);
   3.2. Vertical blocking panels constructed in accordance with Figure R602.10.8.2(3);
   3.3. Full-height engineered blocking panels designed in accordance with the AF&PA WFCM; or
   3.4. Blocking, blocking panels, or other methods of lateral load transfer designed in accordance with accepted engineering practice.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane*. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

TABLE R603.3.1
WALL TO FOUNDATION OR FLOOR CONNECTION REQUIREMENTS [a,b]

FRAMING CONDITION	BASIC WIND SPEED (mph) AND EXPOSURE					
	85 B	90 B	100 B 85 C	110 B 90C	100 C	< 110 C

(Portions of table not shown remain unchanged.)

TABLE R603.3.2(2)
24-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY[a, b, c]
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)		
				8-foot Studs	9-foot Studs	10-foot Studs
Exp. B	Exp. C			Ground Snow Load (psf)		

(Portions of table not shown remain unchanged.)

TABLE R603.3.2(31)
40-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING[a, b, c]
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)		
				8-foot Studs	9-foot Studs	10-foot Studs
Exp. B	Exp. C			Ground Snow Load (psf)		

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(1)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT[a, b, c]
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot Studs	9-foot Studs	10-foot Studs

(Portions of table not shown remain unchanged.)

(TABLE R603.3.2.1(2)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT[a, b, c]
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot Studs	9-foot Studs	10-foot Studs

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(3)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT[a, b, c]
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)					
				Stud Height, *h* (feet)					
Exp. B	Exp. C			10 < *h* □ 12	12 < *h* □ 14	14 < *h* □ 16	16 < *h* □ 18	18 < *h* □ 20	20 < *h* □ 22

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(4)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT[a, b, c]
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)					
				Stud Height, *h* (feet)					
Exp. B	Exp. C			10 < *h* □ 12	12 < *h* □ 14	14 < *h* □ 16	16 < *h* □ 18	18 < *h* □ 20	20 < *h* □ 22

(Portions of table not shown remain unchanged.)

TABLE R603.8
HEAD AND SILL TRACK SPAN

(Portions of table not shown remain unchanged.)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

a. Deflection limit: *L*/240.

b. Head and sill track spans are based on components and cladding wind pressures ~~speeds~~ and 48 inch tributary span.

c. For openings less than 4 feet in height that have both a head track and sill track, the above spans are permitted to be multiplied by 1.75. For openings less than or equal to 6 feet in height that have both a head track and a sill track, the above spans are permitted to be multiplied by a factor of 1.5.

R603.9.4.1 Wind speeds greater than 100 mph. Where the basic wind speed~~s are in excess of~~ exceeds 100 miles per hour (45 m/s) and~~,~~ Exposure C or D applies, walls shall be provided with ~~wind~~ direct uplift connections in accordance with AISI S230, Section E13.3, and AISI S230, Section F7.2, as required for 110 miles per hour (49 m/s), Exposure C.

R611.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above-grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa). Roof overhangs shall not exceed 2 feet (610 mm) of horizontal projection beyond the exterior wall and the dead load of the overhangs shall not exceed 8 pounds per square foot (383 Pa).

Walls constructed in accordance with the provisions of this section shall be limited to buildings ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 130 miles per hour (58 m/s) Exposure B, 110 miles per hour (49 m/s) Exposure C and 100 miles per hour (45 m/s) Exposure D. Walls constructed in accordance with the provisions of this section shall be limited to detached one- and two-family *dwellings* and townhouses assigned to Seismic Design Category A or B, and detached one- and two-family *dwellings* assigned to Seismic Design Category C.

TABLE R611.6(1)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT ABOVE-GRADE WALLS [a, b, c, d, e]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT—BAR SIZE AND SPACING (inches)[f, g]							
				Nominal[h] wall thickness (inches)							
Exposure Category				4		6		8		10	
B	C	D		Top[i]	Side[i]	Top[i]	Side[i]	Top[i]	Side[i]	Top[i]	Side[i]

(Portions of table not shown remain unchanged.)

TABLE R611.6(2)
MINIMUM VERTICAL REINFORCEMENT FOR WAFFLE-GRID ABOVE-GRADE WALLS[a, b, c, d, e]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)[f, g]			
				Nominal[h] wall thickness (inches)			
Exposure Category				6		8	
B	C	D		Top[i]	Side[i]	Top[i]	Side[i]

(Portions of table not shown remain unchanged.)

TABLE R611.6(3)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH SCREEN-GRID ABOVE-GRADE WALLS[a, b, c, d, e]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)[f, g]	
				Nominal[h] wall thickness (inches)	
Exposure Category				6	
B	C	D		Top[i]	Side[i]

(Portions of table not shown remain unchanged.)

TABLE R611.6(4)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT, WAFFLE- AND SCREEN-GRID ABOVE-GRADE WALLS DESIGNED CONTINUOUS WITH FOUNDATION STEM WALLS[a, b, c, d, e, k, l]

BASIC ~~MAXIMUM~~ WIND SPEED (mph)			HEIGHT OF STEM WALL[h, i] (feet)	MAXIMUM DESIGN LATERAL SOIL LOAD (psf/ft)	MAXIMUM UNSUPPORTED HEIGHT OF ABOVE-GRADE WALL (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)[f, g]						
						Wall type and nominal thickness[j] (inches)						
Exposure Category						Flat				Waffle		Screen
B	C	D				4	6	8	10	6	8	6

(Portions of table not shown remain unchanged.)

R613.2 Applicability limits. The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites where the basic ~~subjected to a maximum design~~ wind speed is not greater than ~~of~~ 130 miles per hour (58 m/s), the

Exposure Category is A, B or C, ~~and a maximum~~ the ground snow load is not greater than ~~of~~ 70 pounds per foot (3.35 kPa), and the Seismic Design Category is ~~Categories~~ A, B, or ~~and~~ C.

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)

BASIC WIND SPEED ~~(3-second gust)~~ (mph)			**MINIMUM STUD THICKNESS (mils)**														
			24			**28**			**32**			**36**			**40**		
			Wall Height (ft)			**Wall Height (ft)**			**Wall Height (ft)**			**Wall Height (ft)**			**Wall Height (ft)**		
Exp. A/B	**Exp. C**	**SNOW LOAD (psf)**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**	**8**	**9**	**10**

(Portions of table not shown remain unchanged.)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not greater than two stories in height with each *story* not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is A, B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 *p*g.

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm)in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25-percent slope) or greater than 12:12 (100 percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic ~~design~~ wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

R804.3.2.1 Minimum roof rafter sizes. Roof rafter size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.2.1(1) and R804.3.2.1(2) based on the horizontal projection of the roof rafter span. For determination of roof rafter sizes, reduction of roof spans shall be permitted when a roof rafter support brace is installed in accordance with Section R804.3.2.2. The reduced roof rafter span shall be taken as the larger of the distance from the roof rafter support brace to the ridge or to the heel measured horizontally.

For the purpose of determining roof rafter sizes in Tables R804.3.2.1(1) and R804.3.2.1(2), basic wind speeds shall be converted to equivalent ground snow loads in accordance with Table R804.3.2.1(3). Roof rafter sizes shall be based on the higher of the ground snow load or the equivalent snow load converted from the basic wind speed.

R804.3.3 Hip framing. Hip framing shall consist of jack-rafters, hip members, hip support columns and connections in accordance with this section, or shall be in accordance with an *approved* design. The provisions of this section for hip members and hip support columns shall apply only where the jack rafter slope is greater than or equal to the roof slope. For the purposes of determining member sizes in this section, basic wind speeds shall be converted to equivalent ground snow load in accordance with Table R804.3.2.1(3).

Revise as follows:

R905.3.7 Application. Tile shall be applied in accordance with this chapter and the manufacturer's installation instructions, based on the following:

Clay and concrete roof tiles shall be fastened in accordance with this section and the manufacturer's installation instructions. Perimeter tiles shall be fastened with a minimum of one fastener per tile. Tiles with installed weight less than 9 pounds per square foot (0.4 kg/m2) require a minimum of one fastener per tile regardless of roof slope. Clay and concrete roof tile attachment shall be in accordance with the manufacturer's installation instructions where applied in areas where the basic wind speed exceeds 100 miles per hour (45 m/s) and on buildings where the roof is located more than 40 feet (12 192 mm) above *grade*. In areas subject to snow, a minimum of two fasteners per tile is required. In all other areas, clay and concrete roof tiles shall be attached in accordance with Table R905.3.7.

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

The purpose of this proposal is to coordinate terminology in the code. Figure R301.2.4(A) supplies the "basic wind speed", defined as the "three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1). This wind speed, derived from ASCE 7, is a design wind speed based on an extensive modeling process using historical data, wind characteristics and computer simulations. It is not necessarily the "maximum" wind speed that can be experienced by a site, nor does it suggest the "maximum" wind speed an element is capable of resisting due to factors of safety in material standards and design procedures. This proposal corrects references throughout the IRC to properly refer to "basic wind speed."

Cost Impact: None

R301.2.1.2T-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because the proponent requested disapproval in order to clean it up and bring it back in the public comment period.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal with the following:

Revise Chapter 6 as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

(Portions of table and footnotes not shown remain unchanged)

f. Where the ultimate design ~~For regions having basic~~ wind speed is ~~of~~ ~~110~~140 mph or greater, 8d deformed (21/2" × 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.

g. Where the ultimate design ~~For regions having basic~~ wind speed is ~~of~~ ~~100~~130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. Where the ultimate design ~~When basic~~ wind speed is greater than ~~100~~130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE 602.3(1)

(Portions of table and footnotes not shown remain unchanged)

g. Specified alternate attachments for roof sheathing shall be permitted where the ultimate design wind speed is ~~for windspeeds~~ less than ~~100~~130 mph. Fasteners attaching wood structural panel roof sheathing to gable end wall framing shall be installed using the spacing listed for panel edges.

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS ~~EXPOSED TO WIND SPEEDS OF 100 mph OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D0, D1 and D2~~

(Portions of table not shown remain unchanged)

a. Design required.
b. Table is limited to buildings located where the ultimate design wind speed is 130 mph or less and for which the seismic design category is A, B, C, D0, D1, or D2
c~~b~~. Applicability of this table assumes the following: Snow load not exceeding 25 psf, *fb* not less than 1310 psi determined by multiplying the AF&PA NDS tabular base design value by the repetitive use factor, and by the size factor for all species except southern pine, E not less than 1.6 × 106 psi, tributary dimensions for floors and roofs not exceeding 6 feet, maximum span for floors and roof not exceeding 12 feet, eaves not over 2 feet in dimension and exterior sheathing. Where the conditions are not within these parameters, design is required.
d~~c~~. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

R613.2 Applicability limits. The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the ultimate design wind speed (V_{ult}) is not greater than of ~~120~~ 155 miles per hour (~~54~~ 69 m/s), Exposure ~~A or~~ B or ~~110~~ 140 miles per hour (~~49~~ 63 m/s) Exposure C, the ~~and a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per foot (3.35 kPa), and the Seismic Design Category is ~~ies~~ A, B or ~~and~~ C.

Revise Chapter 8 as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not greater than two stories in height with each *story* not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the ultimate design wind speed is not greater than ~~of~~ 140 ~~110~~ miles per hour (63~~49~~ m/s), the Exposure Category is ~~A,~~ B or C, and the ~~a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 p_g.

Revise Chapter 9 as follows:

R905.2.4.1 Wind resistance of asphalt shingles. Asphalt shingles shall be tested in accordance with ASTM D 7158. Asphalt shingles shall meet the classification requirements of Table R905.2.4.1 for the appropriate maximum ultimate design ~~basic~~ wind speed. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D 7158 and the required classification in Table R905.2.4.1(1).

R905.3.7 Application. Tile shall be applied in accordance with this chapter and the manufacturer's installation instructions, based on the following:

1. Climatic conditions.
2. Roof slope.
3. Underlayment system.
4. Type of tile being installed.

Clay and concrete roof tiles shall be fastened in accordance with this section and the manufacturer's installation instructions. Perimeter tiles shall be fastened with a minimum of one fastener per tile. Tiles with installed weight less than 9 pounds per square foot (0.4 kg/m2) require a minimum of one fastener per tile regardless of roof slope. Clay and concrete roof tile attachment shall be in accordance with the manufacturer's installation instructions where applied in areas where the ultimate design wind speed exceeds 130 ~~100~~ miles per hour (58~~45~~ m/s) and on buildings where the roof is located more than 40 feet (12 192 mm) above *grade*. In areas subject to snow, a minimum of two fasteners per tile is required. In all other areas, clay and concrete roof tiles shall be attached in accordance with Table R905.3.7.

Commenter's Reason: The Building Code Action Committee (BCAC) is submitting this public comment to coordinate terminology in the code. A comprehensive set of proposals was developed by a task group led by NAHB to update the IRC wind provisions to the ultimate wind speed basis of the 2012 IBC and ASCE 7-10. As part of that update, the term "basic wind speed" was changed to "ultimate design wind speed" to be consistent with the term used in the 2012 IBC (and also implemented in a similar update to ICC-600). RB43 as submitted would not have been consistent with those actions, and thus the BCAC requested disapproval during the Committee Action Hearings.

In correlating the actions taken on the comprehensive set of proposals to update the IRC wind provisions to the ultimate wind speed basis of the 2012 IBC and ASCE 7-10, several instances were found where the term "basic wind speed" was not changed to "ultimate design wind speed". This public comment has been developed to make the correlating change in one swoop, in lieu of submitting three separate public comments to RB271, RB396 and RB418. To avoid confusion, the corresponding changes to the wind speed contained in those proposals has been reflected here.

RB43-13

Final Action: AS AM AMPC____ D

RB45-13
R301.2.1.4

Proposed Change as Submitted

Proponent: Matthew L. Mlakar, Barrish Pelham and Associates, Inc., representing Structural Engineers Association of California
Revise as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, *townhouses* or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country and grasslands.
4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water, smooth mud flats, salt flats and unbroken ice for a distance of at least ~~1 mile (1.61 km)~~ 5000 feet (1,524m). ~~Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and Alaska.~~ This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the ~~water~~ unobstructed area. Exposure D extends ~~inland~~ downwind from the ~~shoreline~~ edge of the unobstructed area a distance of ~~1500 feet (457 m)~~ 600 feet (183 m) or ~~10~~ 20 times the height of the building or structure, whichever is greater.

Reason: The 2012 IRC definition for wind exposure category D does not match the definition in either the 2012 IBC or ASCE 7-10. Under ICC CP#28 policy section 1.3.1 the provisions of all codes shall be consistent with one another so that conflicts between codes do not occur. The proposed change is to incorporate the language of ASCE 7-10 section 26.7.3 into the IRC. It should be noted that ASCE 7-10 now requires the use of exposure D along hurricane coastlines. ASCE 7-10 commentary section C26.7, cites recent research which provides data showing that the surface roughness over the ocean in a hurricane is consistent with that of exposure D rather than exposure C.

The change to the exposure categories will bring the IRC in line with the IBC and industry standards.

Cost Impact: The proposal is editorial and will not impact the cost of construction.

R301.2.1.4 #2-RB-MLAKAR

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it created consistency with ASCE 7.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary J. Ehrlich, P.E., representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: The purpose of this public comment is to request disapproval of RB45. While NAHB supports in concept efforts to correlate the definition of Exposure D with ASCE 7-10, the implementation of the "flat unobstructed area" language in this proposal is potentially confusing. Also, the definition here does not correlate with the comprehensive update of the Chapter 3 wind provisions in RB39, which was approved unanimously by the IRC Building Committee.

NAHB worked with SEAOC to develop a floor modification to RB39 to revise the Exposure D definition along the lines of RB45, but with better clarity. The floor modification was ruled out of order, but has been submitted as a public comment to RB39. With approval of that public comment, RB45 should be disapproved.

RB45-13
Final Action: AS AM AMPC____ D

RB48-13

R301.2.2.2.5, R301.2.2.1.2, R502.2.2 (New), R502.3.3.1 (New), Table R502.3.3(1), R502.10.1 (New), R602.10, R602.10.9, R603.1.1, R802.9.1, AJ104.1

Proposed Change as Submitted

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

Revise as follows:

~~**R301.2.2.2.5 Irregular buildings.** The seismic provisions of this code shall not be used for irregular structures located in Seismic Design Categories C, D0, D1 and D2. Irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. When the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted using the provisions of this code. A building or portion of a building shall be considered to be irregular when one or more of the following conditions occur:~~

1. ~~When exterior shear wall lines or *braced wall panels* are not in one plane vertically from the foundation to the uppermost *story* in which they are required.~~

   ~~**Exception:** For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support *braced wall panels* that are out of plane with *braced wall panels* below provided that:~~

   1. ~~Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.~~
   2. ~~The ratio of the back span to the cantilever is at least 2 to 1.~~
   3. ~~Floor joists at ends of *braced wall panels* are doubled.~~
   4. ~~For wood-frame construction, a continuous rim joist is connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 11/2 inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and 5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.~~

2. ~~When a section of floor or roof is not laterally supported by shear walls or *braced wall lines* on all edges.~~

   ~~**Exception:** Portions of floors that do not support shear walls or *braced wall panels* above, or roofs, shall be permitted to extend no more than 6 feet (1829 mm) beyond a shear wall or *braced wall line*.~~

3. ~~When the end of a *braced wall panel* occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and *braced wall panels* offset in plane and to *braced wall panels* offset out of plane as permitted by the exception to Item 1 above.~~

   ~~**Exception:** For wood light-frame wall construction, one end of a *braced wall panel* shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:~~

1. ~~The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply; and~~
2. ~~Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or~~
3. ~~Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) wide; or~~
4. ~~Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) wide; and~~
5. ~~The entire length of the *braced wall panel* does not occur over an opening in the wall below.~~

4. ~~When an opening in a floor or roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor or roof dimension.~~
5. ~~When portions of a floor level are vertically offset.~~

   ~~**Exceptions:**~~

   1. ~~Framing supported directly by continuous foundations at the perimeter of the building.~~
   2. ~~For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.~~

6. ~~When shear walls and *braced wall lines* do not occur in two perpendicular directions.~~
7. ~~When stories above *grade* plane partially or completely braced by wood wall framing in accordance with Section R602 or steel wall framing in accordance with Section R603 include masonry or concrete construction.~~

   ~~**Exception:** Fireplaces, chimneys and masonry veneer as permitted by this code. When this irregularity applies, the entire *story* shall be designed in accordance with accepted engineering practice.~~

R301.2.2.1.2 Alternative determination of Seismic Design Category E. Buildings located in Seismic Design Category E in accordance with Figure R301.2(2) are permitted to be reclassified as being in Seismic Design Category D 2 provided one of the following is done:

1. A more detailed evaluation of the seismic design category is made in accordance with the provisions and maps of the International Building Code. Buildings located in Seismic Design Category E per Table R301.2.2.1.1, but located in Seismic Design Category D per the International Building Code, may be designed using the Seismic Design Category D2 requirements of this code.
2. Buildings located in Seismic Design Category E that conform to the following additional restrictions are permit-ted to be constructed in accordance with the provisions for Seismic Design Category D2 of this code:
   2.1. All exterior shear wall lines or braced wall panels are in one plane vertically from the foundation to the uppermost story.
   2.2. Floors shall not cantilever past the exterior walls.2.3. The building <u>or portions of the building are constructed in accordance with the requirements for structures assigned to Seismic Design Category D2 elsewhere in this code.</u> ~~is within all of the requirements of Section R301.2.2.2.5 for being considered as regular.~~

Revise as follows:

R502.2 Design and construction. Floors shall be designed and constructed in accordance with the provisions of this chapter, Figure R502.2 and Sections R317 and R318 or in accordance with AF&PA/NDS.

R502.2.1 Framing at braced wall lines. A load path for lateral forces shall be provided between floor framing and *braced wall panels* located above or below a floor, as specified in Section R602.10.8.

R502.2.2 Vertically offset floor diaphragms in Seismic Design Category C, D0, D1 and D2. In structures or portions of structures in Seismic Design Category C, D0, D1 and D2, floor diaphragms or portions of floor diaphragms shall not be vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.

R502.3.3 Floor cantilevers. Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2).

R502.3.3.1 Floor cantilevers in Seismic Design Categories D0, D1 or D2. Floor cantilevers supporting *braced wall panels* in all structures assigned to *Seismic Design Categories* D0, D1 or D2 and in townhouses in Seismic Design Category C shall be constructed in accordance with Section R602.10.9.

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLYa, b, c, f, g, h
(Floor Live Load ☐ 40 psf, Roof Live Load ☐20 psf)

(Potions of table not shown remain unchanged)

a through e *(No changes to text)*
f. See Section ~~R301.2.2.2.5~~ R602.10.9, Item 1, for additional limitations on cantilevered floor joists for ~~detached one- and two-family~~ dwellings in Seismic Design Category D0, D1, or D2 and townhouses in Seismic Design Category C.~~, D0, D1 or D2.~~
g through h *(No change to text)*

R502.10 Framing of openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

R502.10.1 Framing of openings in Seismic Design Categories C, D0, D1 and D2. In structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, where an opening in a floor exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor dimension, that portion of the structure shall be designed in accordance with accepted engineering practice to the extent that the opening affects the performance of the remaining structural system.

Revise as follows:

R602.10 Wall bracing. Buildings shall be braced in accordance with this section or, when applicable, Section R602.12. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1.

For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, stories above *grade* plane partially or completely braced by wood wall framing in accordance with this section shall not include masonry or concrete construction or the entire *story* shall be designed in accordance with accepted engineering practice.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code.

R602.10.9 Braced wall panel support. *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support *braced wall panel*s.

   For structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, cantilevered floor joists supporting braced wall panels shall also comply with all of the following:

   1. Floor joists shall be nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
   2. The ratio of the back span to the cantilever shall be at least 2 to 1.
   3. Floor joists at ends of *braced wall panels* shall be doubled.
   4. For wood-frame construction, a continuous rim joist shall be connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) in thickness and 11/2 inches (38 mm) in width fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
   5. Gravity loads carried at the end of cantilevered joists shall be limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.

2. Elevated post or pier foundations supporting *braced wall panel*s shall be designed in accordance with accepted engineering practice.
3. Masonry stem walls with a length of 48 inches (1219 mm) or less supporting *braced wall panel*s shall be reinforced in accordance with Figure R602.10.9. Masonry stem walls with a length greater than 48 inches (1219 mm) supporting *braced wall panel* s shall be constructed in accordance with Section R403.1 Methods ABW and PFH shall not be permitted to attach to masonry stem walls.
4. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall have reinforcement sized and located in accordance with Figure R602.10.9.
5. For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, the end of a *braced wall panel* over an opening in the wall below shall not extend a horizontal distance greater than 1 foot (305 mm) from the end of the panel to the edge of the opening. This provision is applicable to *braced wall panels* offset in plane and to *braced wall panels* offset out of plane as permitted by the exception to Item 1 above.

   Exception: For wood light-frame wall construction, one end of a *braced wall panel* shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:

   1. The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply; and
   2. Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or
   3. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) wide; or
   4. Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) wide; and

5. The entire length of the *braced wall panel* does not occur over an opening in the wall below.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane* . All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure B or C and a maximum ground snow load of 70 pounds per square foot (3.35 kPa).

For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, stories above *grade* plane walls partially or completely braced by cold-formed wall framing in accordance with this section shall not include masonry or concrete construction or the entire *story* shall be designed in accordance with accepted engineering practice.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code.

Revise as follows:

R802.9 Framing of openings. Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

R802.9.1 Framing of openings in Seismic Design Categories C, D0, D1 and D2. For structures or portions of structures in Seismic Design Category C, D0, D1 or D2 when an opening in a roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least roof dimension, that portion of the structure shall be designed in accordance with accepted engineering practice to the extent the opening affects the performance of the remaining structural system.

Revise as follows:

SECTION AJ104
EVALUATION OF AN EXISTING BUILDING

AJ104.1 General. The *building official* may require an existing building to be investigated and evaluated by a registered design professional in the case of proposed reconstruction of any portion of a building. The evaluation shall determine the existence of any potential non-conformities to these provisions, and shall provide a basis for determining the impact of the proposed changes on the performance of the building. The evaluation shall use the following sources of information, as applicable:

1. Available documentation of the existing building.
   1.1. Field surveys.
   1.2. Tests (nondestructive and destructive).
   1.3. Laboratory analysis.

   Exception: Detached one- or two-family dwellings that comply with Section R102.7. ~~are not irregular buildings under Section R301.2.2.2.5~~ and are not undergoing an extensive reconstruction shall not be required to be evaluated.

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

This proposal is to delete the concept of "Irregular Structures" from Section R301.2.2.2.5 from the code and relocate the specific construction requirements of the irregular structures into the applicable sections of the code where they are relevant. As currently written, the list of items defining "Irregular Structures" in high seismic categories is a laundry list of items that cause the structure to be outside of the scope of this code. Then, for most of the defined irregularities there is an exception including technical construction requirements that, when done, allow the structure to not be classified as "Irregular". So, in essence, the current section of "Irregular structures" items are exceptions to the code. Then the exceptions to each item are exceptions to the exception. This makes poor code language.

In addition, many code users are not aware of these requirements because they are located in Chapter 3. As an example, when a code user is looking to the code to determine how to construct cantilever floor joists, they would go to Chapter 5, "Floor Framing". There is a section addressing cantilevers. However, in this section in Chapter 3 it says when a floor cantilevers and supports a wall above (not in the same vertical plane) it is irregular. Then the exception to the exception defines how to construct the floor so that it will not be considered irregular. The BCAC determined that it would be much better to actually include the cantilever construction requirements in the actual section in Chapter 5 that describes cantilevered floor construction.

This proposal does not make any technical changes to the code. It merely moves the construction requirements and limitations therein to the applicable sections that already exist in Chapter 5, Floor framing, Chapter 6, Wall framing and Chapter 8 Roof framing. The limitations are still applicable and by relocating them they will be more noticeable and apparent. The current code already has language and provisions to cover construction that exceeds the limitations of this code.

As shown below, R301.1 states that when, **"… construction is in accordance with the provision of this code…"** it is deemed to comply and the converse is true as well. When construction is NOT in accordance with the provisions it does not comply. Further, Section R301.1.3 it states that, **"…elements exceeding the limits of Section R301 or otherwise not conforming to this code."** shall require an engineered design. With the specific construction requirements now in the applicable code sections, those two provisions already exist and adequately address the cases when mandatory code requirements are exceeded.

> ***R301.1 Application.*** *Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures* ***in accordance with the provisions of this code*** *shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.*
>
> ***R301.1.3 Engineered design.*** *When a building of otherwise conventional construction contains structural* ***elements exceeding the limits of Section R301 or otherwise not conforming to this code****, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with the International Building Code is permitted for all buildings and structures, and parts thereof, included in the scope of this code.*

The existing Section R301.2.2.2 defines limitations for the use and scope of this code for structures in Seismic Design Category C such as weights of materials, stone and masonry veneer, masonry and concrete construction. The existing Section R301.2.2.3 defines further limitations for Seismic Design Category D0, D1 and D2 in addition to the Seismic Design Category C limitations such as height limitations. These two sections remain as is and the current limitations apply.
The net effect is the same and proposal makes the code much more user friendly and will prevent the oversight of the specific construction requirements and limitations that now exist in Chapter 3.

Cost Impact: The code change does not change the existing requirements of the code and will not increase the cost of construction.

R301.2.2.2.5-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the proposed simplification reduces clarity and usability of the code. In addition, the torsional irregularities are missing and the cold formed steel industry has concerns that they are receiving benefits to which they may not be entitled.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal with the following:

R502.2 Design and construction. Floors shall be designed and constructed in accordance with the provisions of this chapter, Figure R502.2 and Sections R317 and R318 or in accordance with AF&PA/NDS.

R502.2.1 Framing at braced wall lines. A load path for lateral forces shall be provided between floor framing and *braced wall panels* located above or below a floor, as specified in Section R602.10.8. In all structures or portions of structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, vertical offsets in floor diaphragms and braced wall support shall comply with the requirements of Section R301.2.2.2.5

R502.3.3 Floor cantilevers. Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2). Floor cantilevers supporting *braced wall panels* in all structures assigned to *Seismic Design Categories* D0, D1 or D2 and in townhouses in Seismic Design Category C shall be constructed in accordance with Section R301.2.2.2.5, Item 1.

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY[a, b, c, f, g, h]
(Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)

Member & Spacing	Maximum Cantilever Span (Uplift Force at Backspan Support in Lbs.)[d, e]											
	Ground Snow Load											
	≤ 20 psf			30 psf			50 psf			70 psf		
	Roof Width			Roof Width			Roof Width			Roof Width		
	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft
2 × 8 @ 12″	20″ (177)	15″ (227)	—	18″ (209)	—	—	—	—	—	—	—	—
2 × 10 @ 16″	29″ (228)	21″ (297)	16″ (364)	26″ (271)	18″ (354)	—	20″ (375)	—	—	—	—	—
2 × 10 @ 12″	36″ (166)	26″ (219)	20″ (270)	34″ (198)	22″ (263)	16″ (324)	26″ (277)	—	—	19″ (356)	—	—
2 × 12 @ 16″	—	32″ (287)	25″ (356)	36″ (263)	29″ (345)	21″ (428)	29″ (367)	20″ (484)	—	23″ (471)	—	—
2 × 12 @ 12″	—	42″ (209)	31″ (263)	—	37″ (253)	27″ (317)	36″ (271)	27″ (358)	17″ (447)	31″ (348)	19″ (462)	—
2 × 12 @ 8″	—	48″ (136)	45″ (169)	—	48″ (164)	38″ (206)	—	40″ (233)	26″ (294)	36″ (230)	29″ (304)	18″ (379)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

(No change to the table)

(footnotes not shown remain unchanged)

f. See Section R301.2.2.2.5, Item 1, for additional limitations on cantilevered floor joists for ~~detached one- and two-family dwellings~~ all structures in Seismic Design Category D0, D1, or D2 and townhouses in Seismic Design Category C.~~, D0, D1 or D2.~~

R502.10 Framing of openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm). In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, openings shall be subject to the limitations of Section R301.2.2.2.5, Item 4.

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure B or C, and a maximum ground snow load of 70 pounds per square foot (3.35 kPa). <u>All structures or portions of structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, shall comply with the requirements of Section R301.2.2.2.5</u>

R505.3.8 Framing of floor openings. Openings in floors shall be framed with header and trimmer joists. Header joist spans shall not exceed 6 feet (1829 mm) or 8 feet (2438 mm) in length in accordance with Figure R505.3.8(1) or R505.3.8(2), respectively. Header and trimmer joists shall be fabricated from joist and track members, having a minimum size and thickness at least equivalent to the adjacent floor joists and shall be installed in accordance with Figures R505.3.8(1), R505.3.8(2), R505.3.8(3), and R505.3.8(4). Each header joist shall be connected to trimmer joists with four 2 inch by 2 inch (51 mm by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The clip angles shall have a thickness not less than that of the floor joist. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous). <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, openings shall be subject to the limitations of Section R301.2.2.2.5,</u>

R602.10 Wall bracing. Buildings shall be braced in accordance with this section or, when applicable, Section R602.12. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1. <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, wall bracing support shall comply with the requirements of Section R301.2.2.2.5.</u>

R602.10.9 Braced wall panel support. *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support *braced wall panel*s. <u>In all structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, cantilevered floor joists supporting braced wall panels shall comply with the requirements of Section R301.2.2.2.5, Item 1.</u>
2. *No change*.
3. *No change*
4. *No change*
5. <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, the end of a *braced wall panel* over an opening in the wall below shall comply with the requirements of Section R301.2.2.2.5, Item 3.</u>

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane* . All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure B or C and a maximum ground snow load of 70 pounds per square foot (3.35 kPa). <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, wall bracing shall comply with the requirements of Section R301.2.2.2.5.</u>

R802.9 Framing of openings. Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm). <u>In all structures or portions of structures in Seismic Design Category C, D0, D1 or D2 and in townhouses in Seismic Design Category C, openings in roofs shall comply with the requirements of Section R301.2.2.2.5, Item 4.</u>

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25- percent slope) or greater than 12:12 (100-percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure B or C, and a maximum ground snow load of 70 pounds per square foot (3350 Pa). <u>In all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, cold-formed steel roof framing shall comply with the requirements of Section R301.2.2.2.5.</u>

R804.3.6 Framing of openings in roofs and ceilings. Openings in roofs and ceilings shall be framed with header and trimmer joists. Header joist spans shall not exceed 4 feet (1219 mm) in length. Header and trimmer joists shall be fabricated from joist and track members having a minimum size and thickness at least equivalent to the adjacent ceiling joists or roof rafters and shall be installed in accordance with Figures R804.3.6(1) and R804.3.6(2). Each header joist shall be connected to trimmer joists with a minimum of four 2-inch by 2-inch (51 by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The steel thickness of the clip angles shall be not less than that of the ceiling joist or roof rafter. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous). In all structures or portions of structures in Seismic Design Category C, D0, D1 or D2 and in townhouses in Seismic Design Category C, openings in roofs shall comply with the requirements of Section R301.2.2.2.5, Item 4.

Reason: The Building Code Action Committee (BCAC) is requesting approval of this public comment that addresses the code development committees concerns. The original proposal intended to remove the requirements of “Irregular Structures” from Section R301.2.2.2.5 and relocate them into the applicable sections of the code where they are relevant. The reason was that many code users are not aware of these limitations and requirements because they are located in Chapter 3. Neither the original proposal nor this public comment make any technical changes to the code.

1. At the Committee Action Hearings, some of the code development committee members thought that the original proposal to remove the requirements from Section R301.2.2.2.5 reduced clarity and usability of the code. Therefore this public comment takes the opposite tact and leaves the current provisions in R301.2.2.2.5 and adds a pointer in each of the applicable code sections that might otherwise be overlooked. The provisions for torsional irregularities mentioned by the code development committee are also now unaffected and remain intact in Section R301.2.2.2.5.

In addition, there were comments made that the provisions for cold-formed steel construction were not adequately addressed. As stated, this public comment leaves the requirements and limitations in R301.2.2.2.5 where they are currently located and adds pointers to the applicable provisions of the cold-formed steel construction section.

Cost Impact: The code change does not change the existing requirements of the code and will not increase the cost of construction.

RB48-13

Final Action: AS AM AMPC____ D

RB56-13
R301.5, Table R301.5

Proposed Change as Submitted

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates Inc., representing self (skerr@jwa-se.com)

Revise as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
AND MINIMUM CONCENTRATED LIVE LOADS
~~(in pounds per square foot)~~

~~OCCUPANCY OR~~ USE	~~LIVE LOAD~~ UNIFORM (psf)	CONCENTRATED (lbs.)
Uninhabitable attics without storage[b]	10	-
Uninhabitable attics with limited storage[b,g]	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks[e]	40	-
Fire escapes	40	-
Guardrails and handrails[d]	- ~~200[h]~~	200[h]
Guardrail in-fill components[f]	- ~~50[h]~~	50[h]
Passenger vehicle garages~~[a]~~	40 ~~50[a]~~	Note a
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40~~[c]~~	300[c]

a. Elevated garage floors shall be capable of supporting a 3,000 ~~2,000~~ pound load applied on an area of ~~over a~~ 20 square-inches ~~area~~.

b (*No change to current text*)

c. The minimum concentrated load on stair treads shall be applied on ~~Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over~~ an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load.~~, whichever produces the greater stresses.~~

d through h (*No change to current text*)

Reason: As currently presented, the tile of Table R301.5 states that the loads as uniformly distributed and that the loads are in pounds per square foot. However, this is incorrect, since the guardrail and handrail loads shown are concentrated loads. By splitting the loads into two columns, the Live Load table will accurately represent what type of live load is shown. The passenger vehicle garage loads were also changed to reflect the changes that occurred to the live load in the 2012 IBC.

These changes will make the IRC Live Load table match the format and values of the IBC and ASCE 7 Live Load tables.

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

R301.5-RB-KERR

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because a) no analysis was given for additional construction costs in accordance with CP#28, b) the stair criteria needs tweaks and c) we are dealing with residential garages, not apartment buildings, and 2,000 pounds has proved to be adequate for residential garages.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Stephen Kerr, Josephson Werdowatz and Associates, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS,
AND MINIMUM CONCENTRATED LIVE LOADS,

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
Uninhabitable attics without storage[b]	10	-
Uninhabitable attics with limited storage[b,g]	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks[e]	40	-
Fire escapes	40	-
Guardrails and handrails[d]	-	200[h]
Guardrail in-fill components[f]	-	50[h]
Passenger vehicle garages[a]	40	Note a
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40[c]	300[c]

a. Elevated garage floors shall be capable of supporting a ~~3,000~~ 2,000-pound load applied on an area of 20 square-inches.
c. The minimum concentrated load on stair treads shall be applied on an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load.

(Footnotes not show to remain unchanged)

Commenter's Reason:
A) The issue of construction cost was raised with the original proposal changing the elevated garage floor point load to 3000 pounds. With the proposed modification to the keep the 2000 pound point load intact, there are no substantial changes to the language, and so the design under this As Modified proposal would be identical to a design under the current 2012 IRC. Therefore, there is no change in cost of construction as a result of the proposed change.
B) There was a comment that the stair point load needs to be tweaked. We disagree with the commenter's reasoning. With one exception, the proposed language is copied word-for-word from footnote f of the 2012 IBC. The only change, for consistency with the other footnotes in IRC Table R301.5, is that the point load is shown as "4 square inches" versus the IBC which uses "2 inch by 2 inch" to describe the size of the point load. The proposed change will bring consistency between the IBC and IRC and does not reflect any new loading on stair treads.
C) The concentrated point load for elevated garage floors is revised to keep the 2000 pound point load in the IRC. This will maintain continuity between the 2012 and 2015 IRC editions.

Public Comment 2:

Edwin T. Huston, Smith & Huston, Inc., Consulting Engineers, representing National Council of Structural Engineers Association (NCSEA) Code Advisory Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS,
AND MINIMUM CONCENTRATED LIVE LOADS,

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
Uninhabitable attics without storage[b]	10	-
Uninhabitable attics with limited storage[b,g]	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks[e]	40	-
Fire escapes	40	-
Guardrails and handrails[d]	-	200[h]
Guardrail in-fill components[f]	-	50[h]
Passenger vehicle garages[a]	40	Note a
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40[c]	300[c]

a. Elevated garage floors shall be capable of supporting a 3,000 pound wheel load applied on an area of 20 square-inches.
b. The minimum concentrated load on stair treads shall be applied on an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load.

(Portions of footnotes not shown remain unchanged)

Commenter's Reason: The IBC load for garages includes a 40 psf design load and a 3,000 pound concentrated load. This change in the 2003 IBC and was based on a Code Change Proposal S14-02 submitted by Jim Rossberg, then of the Structural Engineering Institute of ASCE. That Code Change Proposal read in part:

> SEI funded a study to arrive at an appropriate design value. A load survey of vehicle weights was conducted at 9 commercial parking garages in Chicago and Champaign, Illinois and Boston and Cambridge, Massachusetts. Statistical analyses of the maximum load effects on beams and columns due to vehicle loads over the garage's life were carried out using the survey results. The equivalent uniformly distributed loads that would product the 30-year maximum column axial force and mid-span beam bending moment are conservatively estimated at 34.8 (psf). The EUDL (Equivalent Uniform Design Load) is not sensitive to bay-size variation. Details of this study can be found in Wen and Yeo (1999).
>
> Because of the observation of the continued increase consumption by the public of very heavy passenger vehicles such as sport-utility vehicles, a design load of 40 psf was approved by the ASCE 7 standards committee with no allowance for reduction according to bay area and a corresponding increase in the concentrated load.
>
> Based on the above rationale and the published study by Wen and Yeo, the ASCE 7 standards committee approved a change to the live load provisions for passenger vehicle parking garages. This change would make the provisions of the IBC consistent with those of ASCE 7-02.
>
> REFERENCES
>
> *Wen Y.K. and Yeo, G. L.,.* "Design Live Loads for Parking Garages" available from ASCE, 1801 Alexander Bell Drive, Reston, Virginia, 20191. 1-800-548-2723.

This Public comment would add the word "wheel" so that this concentrated load is not confused with an axle load.

The IRC Building Committee noted in their reason for disapproval that "we are dealing with residential garages, not apartment buildings, and 2,000 pounds has proved to be adequate for residential garages".

A review of Gross Vehicle Weights (GVW) and Gross Axle Weight Ratings (GAWR) from manufacturer's specifications indicates that many popular light trucks and large sport-utility vehicles have axle ratings that exceed the 2,000 pound concentrated load. For example, consider the following:

Manufacturer	Model	GVW	GAWR
Ford	F 350	10,100 Pounds	6,262 pounds
Ford	F 450	14,000 Pounds	9,500 pounds
Chevrolet	Silverado 3500 HD	9,900 Pounds	6,390 pounds
Chevrolet	Suburban 2500	8,600 Pounds	5,500 pounds
Dodge	Ram 3,500	10,100 Pounds	6,200 Pounds

There are of course, many vehicles which are much lighter. One opponent at the Code Change Hearings also noted that there were Smart Cars and Minis being sold as well. Clearly, the provisions of the IRC should be based on typical heavy vehicles, not typical light vehicles.

If this Public Comment is approved, there will be a modest increase in construction costs for that small percentage of garages which are elevated. The majority of garages are built on a slab-on-grade. This change will not impact garages built on a slab-on-grade.

This change will align the IRC with the IBC with respect to the magnitude of the loads. This alignment meets the intent of CP-05 section 1.3.1 regarding code correlation.

"1.3.1 Code Correlation: The provisions of all Codes shall be consistent with one another so that conflicts between the Codes do not occur. Where a given subject matter or code text could appear in more than one Code, the ICC Board shall determine which Code shall be the primary document, and therefore which code development committee shall be responsible for review and maintenance of the code text. Duplication of content or text between Codes shall be limited to the minimum extent necessary for practical usability of the Codes, as determined in accordance with Section 4.4."

We urge you to overturn the committee so that we can bring this Public Comment to the floor.

RB56-13

Final Action: AS AM AMPC____ D

RB57-13
Table R301.5

Proposed Change as Submitted

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

Revise as follows:

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)

(Portions of table not shown remain unchanged)

a through f *(No change to current text)*

g. Uninhabitable attics with limited storage are those where the maximum clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches.
2. The slopes of the joists or truss bottom chords are no greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed <u>non-</u>concurrent live load of not less than 10 lb/ft2.

h. *(No change to current text)*

Reason The intent of this proposal is to bring the IRC into agreement with the IBC, Table 1607.1, footnote ‘i”; ASCE 7, Table 4-1, footnotes “l” and “m” and the IRC Table R301.5, footnote “b”.

The requirement for the 10 PSF live load on those portions of the bottom chords not serving as storage areas was originally intended to reflect the requirement to provide a 10 PSF load per Table R301.5, footnote “b” for uninhabitable attics without storage on those portions of the joist or truss where a storage load is not applied. Footnote b clearly indicates that this is a non-concurrent load (intended for occasional access for maintenance).This is confirmed by the Commentary to the 2012 IBC, Table 1607.1 which states in part, “…Historically, a minimum load of 10 psf (0.48 kN/m2) has been viewed as appropriate where occasional access to the attic is anticipated for maintenance purposes, but significant storage is restricted by physical constraints, such as low clearance or the configuration of truss webs. It provides a minimum degree of structural integrity, allowing for occasional access to an attic space for maintenance purposes. ***Allowing the application of this load to be independent of other live loads is deemed appropriate, since it would be rare for this load and other maximum live loads to occur at once.”[emphasis added]***

Current truss design methodology also treats this 10 PSF non-storage load as a non-concurrent live load intended for occasional access for maintenance purposes. Furthermore, the change to this section (S57-09/10) was intended to coordinate the language with the ASCE 7-10 which was in draft form at the time the original proposal was submitted. During the public comment period, ASCE 7 was corrected to show that this is a non-concurrent load but the change was not picked up in the IRC. This code change simply coordinates this footnote with Table 1607.1, Table R301.5 footnote b, ASCE 7, and with the original intent of S57-09/10.

For reference, Table R301.5, footnote “b” states:

b. Uninhabitable attics without storage are those where the maximum clear height between the joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirements.**

ASCE 7-10, Table 4-1,footnotes “l” and “m” state:

[l] Uninhabitable attic areas without storage are those where the maximum clear height between the joist and rafter is less than 42 in. (1,067 mm), or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 in. (1,067 mm) in height by 24 in. (610 mm) in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirement.**

[m] Uninhabitable attic areas with storage are those where the maximum clear height between the joist and rafter is 42 in. (1,067 mm) or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 in. (1,067 mm) in height by 24 in. (610 mm) in width, or greater, within the plane of the trusses. At the trusses, the live load need only be applied to those portions of the bottom chords where both of the following conditions are met:

i. The attic area is accessible from an opening not less than 20 in. (508 mm) in width by 30 in. (762 mm) in length that is located where the clear height in the attic is a minimum of 30 in. (762 mm); and
ii. The slope of the truss bottom chord is no greater than 2 units vertical to 12 units horizontal (9.5% slope).

The remaining portions of the bottom chords shall be designed for a uniformly distributed nonconcurrent live load of not less than 10 Ib/ft2 (0.48 kN/m2).
IBC Table 1607.1, footnote "I" states:

i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirements.**

Note that the IBC, Table 1607.1 footnote "j" is also inconsistent with ASCE 7, the IRC and the IBC, table 1607.1, footnote "i".

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

R301.5-RB-WAINRIGHT

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: The committee approved this proposed code change because they felt that it correlates the International Residential Code requirements with those of the International Building Code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edwin T. Huston, Smith & Huston, Inc., Consulting Engineers, representing National Council of Structural Engineers Association (NCSEA) Code Advisory Committee, requests Disapproval.

Commenter's Reason: The committee reason for Approval as Submitted was "*The committee approved this proposed code change because they felt that it correlates the International Residential Code requirements with those of the International Building Code*".

The proponent of RB57-13 opens their reason statement by saying that "*The intent of this proposal is to bring the IRC into agreement with the IBC, Table 1607.1, footnote 'i"; ASCE 7, Table 4-1, footnotes "l" and "m" and the IRC Table R301.5, footnote "b"."* This intent needs to be carefully followed to be understood. As written, the reason statement is, at best, unclear, if not deceptive. The IBC Table 1607.1, footnote 'i"; ASCE 7, Table 4-1, footnote "l" and the IRC Table R301.5, footnote "b" all deal with "uninhabitable attics ***without*** storage". The change is being made to "uninhabitable attic ***with*** storage". The intent of RB57-13 is to apply a provision from "uninhabitable attics without storage" to "uninhabitable attic with storage", and in so doing to lessen the requirements of the IRC. The result is **not** alignment of similar provisions of the IRC with the IBC, but to break that alignment!

The 10 psf live load in the IBC and the IRC for uninhabitable attics without storage "need not be assumed to act concurrently with any other live load requirement" to accommodate unanticipated storage loads as described below. This wording is the same in both codes.

When the attic has a large enough access opening; placed where the clear height in the attic is a minimum of 30 inches; is tall enough that "an assumed rectangle 42 inches in height by 24 inches in width, or greater" can be accommodated; it is considered to be an "uninhabitable attic with storage".

In the IBC and in the 2012 IRC the live load of an "uninhabitable attic with storage" is 20 psf where that assumed rectangle 42 inches in height by 24 inches in width, or greater" can be accommodated, and the "remaining portions of the joists or truss bottom chords shall be designed for a uniform concurrent live load of not less than" 10 psf. In other words, where you have enough height that you could store a couple of bankers boxes of old papers, a 20 psf load is required. When the roof slope reduces the clear height below 42 inches, then the load can be stepped down to 10 psf. This makes sense. There is less clear height, so those portions can be designed for a smaller load.

The intent of RB57-13 is to make the 10 psf portion of the load **non-**concurrent. This language is ambiguous, and may be unenforceable. Non-concurrent with what? Non-concurrent with the 20 psf load? Non-concurrent with "any other live load requirement"? The proponent doesn't say.

If home owners are storing material in an attic, they are not going to be only storing it in those areas where there is 42 inches of clear height. They will store more material where there is 42 inches of clear height, but they will also store material in those portions of the attic where there is less than 42 inches of clear height.

For example, if the attic access is at a location where there is only 30 inches of clear height, and a home owner is going to store material where there is 42 inches of clear height, then it stands to reason that they will also store material between that taller area and the attic access.

I have been in many attics after wind storms to document fallen tree damage to trusses, and I have routinely seen material being stored in areas where there is less than 42 inches of clear height.

If material is being stored, it will be present when there is live load or snow load on the roof, and it needs to therefore be concurrent.

Neither the IBC nor the IRC footnotes align with the footnotes of ASCE 7-10 on the loading requirements for "uninhabitable attic with storage". While RB57-13 would bring the IRC into closer alignment with ASCE 7-10, there would still be misalignment in other parts of these same footnotes. This section of ASCE 7-10 is currently being modified, so attempting to align with ASCE 7 is premature.

The committee may have been persuaded that they were correlating the IRC with the IBC, but in reality, they were not. I urge you to overturn the committee and disapprove the proposal.

RB57-13

Final Action: AS AM AMPC____ D

RB60-13
Table R301.7

Proposed Change as Submitted

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

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS [b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors~~/ceilings with plaster or stucco finish~~ <u>(including deck floors)</u>	L/360
<u>Ceilings with brittle finishes (plaster, stucco, etc)</u>	<u>L/360</u>
<u>Ceilings with flexible finishes (gypsum board, etc)</u>	<u>L/240</u>
All other structural members	L/240
Exterior walls—wind loads [a] with plaster or stucco finish	H/360
Exterior walls with other brittle finishes	H/240
Exterior walls with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: *L* = span length, *H* = span height.

a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.

b For cantilever members, *L* shall be taken as twice the length of the cantilever.

c. For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *L*/175 for each glass lite or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed *L*/120.

d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.

e. Refer to Section R703.7.2.

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

This code change was intended to clarify two issues.

1. There is confusion regarding the deflection allowed for deck joists. It was not clear if the original authors intended deck joists to be considered as a floor joist (L/360) or as "other structural members" (L/240). This clarifies the intention.
2. The other significant change addresses the flexibility/stiffness of gypsum board which is a lot more common than either plaster of stucco in most parts of the country. There is now cleaner differentiation between materials and is consistent with the allowable deflection limits in Table R802.4(1) and R802.4(2).

Cost Impact: None.

R301.7T-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that, although it was a good idea conceptually, there was not enough consensus regarding the stiffness of the decking.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS [b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors ~~(including deck floors)~~	L/360
Ceilings with brittle finishes (<u>including </u>plaster~~,~~ <u>and </u>stucco~~, etc~~)	L/360
Ceilings with flexible finishes (<u>including</u> gypsum board~~, etc~~)	L/240
All other structural members	L/240
Exterior walls—wind loads [a] with plaster or stucco finish	H/360
Exterior walls with other brittle finishes	H/240
Exterior walls with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls [e]	L/600

Note: *L* = span length, *H* = span height.

a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.
b For cantilever members, *L* shall be taken as twice the length of the cantilever.
c. For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *L*/175 for each glass lite or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed *L*/120.
d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.
e. Refer to Section R703.7.2.

Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committees concerns:

The revisions to the original proposal are intended to do the following:

1) Removes a proposed reference to decks. There was no consensus as to whether deck floors meant deck boards or deck joists. We leave this controversy unresolved by removing the reference to decks from the original proposal.
2) Retains the separate lines in the table for floors and ceilings, so it is clear that all floors are L/360, which is the current intent of the table (the current entry for “floors/ceilings with plaster or stucco finish” is intended to apply to all floors and all ceilings with plaster or stucco finish);
3) Makes it clear that gypsum board is considered a flexible finish
4) Makes some minor editorial changes to remove “etc.” which is not typical code language.

In short, there are no technical changes to the content of this table with this public comment, only clarification.

RB60-13
Final Action: AS AM AMPC____ D

RB61-13
Table R301.7

Proposed Change as Submitted

Proponent: Cole Graveen PE, SE, Raths, Raths & Johnson, Inc., representing self (cwgraveen@rrj.com)

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
All other structural members	L/240
Guards[f,g] Post (horizontal deflection) Top Rail (horizontal deflection) Top Rail (vertical deflection)	 H/12 H/24 + L/96 L/96

(Portions of table not shown remain unchanged)

a through e *(No change to current text)*
f. For the guard post, H shall be taken as the distance from the top of the top rail to the first point of support.
g. For the guard top rail, H shall be taken as the height of the rail and L shall be taken as the distance between edges of the post supports. The deflection of the top rail is measured relative to the center of the two posts.

Reason: Specific deflection limits for guards are proposed to clarify serviceability requirements and to help ensure occupant safety and comfort.

The serviceability requirements for guards in the both the IBC and IRC are vague and open to interpretation. The IBC requires all structural systems and members to have adequate stiffness to limit deflections and lateral drift, Section 1604.3, however it contains no specific deflection limits for guards. The IRC contains a general deflection limit of L/240 in Table R301.7 for all structural members not otherwise listed in the table. However, it is not likely that this limit was originally intended to apply to guards nor does it appear that this limit is commonly applied to guards in design or code enforcement.

The deflection limits proposed in this code change are based upon existing requirements in ASTM E985, *Standard Specification for Permanent Metal Railing Systems and Rails for Buildings*, ASTM D7032, *Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)*, and ICC-ES AC273, *Acceptance Criteria for Handrails and Guards*. The proposed limits allow reasonable deflection of the guard post and top rail while still ensuring that the guard will perform its intended function of preventing accidental falls. It is important to note that while excessive deflection is undesirable, some deflection is desirable[4] as it can provide warning to the occupant that they are at an edge of an elevated surface and may be unduly loading the guard.

Specific deflection limits are needed not only for clarity, but also to establish acceptable performance. Guards are provided to minimize the possibility of occupants accidentally falling from an elevated surface. The ability of a guard to prevent such an accidental fall depends on its stiffness as well as its height and strength. Guards that meet the strength and height requirements of the code but that move excessively under load could potentially not prevent an accidental fall. Limiting guard deflections to appropriate amounts will help protect occupants against accidentally falling from an elevated surface.

In addition, specific deflection limits are also necessary to help ensure that occupants are comfortable and feel safe. Similar to floor deflection limits that ensure that occupants are not uncomfortable or annoyed with bouncy floors or building drift limits that ensure that occupants are not uncomfortable or sick due to the swaying motion of tall buildings, reasonable lateral deflection limits for guards will help ensure that occupants do not feel that the guard is unsafe.

Example: Under the proposed deflection provisions, the post for a residential guard with a top rail height of 36" above the walking surface and a point of support 3" below the walking surface would have a deflection limit of (36 + 3)/12 = 3.25 inches. The top rail spanning between 4" wide posts that are spaced 4' apart would have a horizontal deflection limit of (48 – 4)/96 + (36 + 3)/24 = 2.10 inches.

References:

1. ASTM E985-00(2006), Standard Specification for Permanent Metal Railing Systems and Rails for Buildings
2. ASTM D7032-08, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)
3. ICC-ES AC273, Acceptance Criteria for Handrails and Guards, Corrected January 2009
4. Loferski, J., Albright, D., and Woeste, F. (July 2007) Tested Guardrail Post Connections for Residential Decks, Structure Magazine

Cost Impact: This code change proposal may increase the cost of construction by increasing the design costs. Designers may have to perform additional serviceability calculations.

R301.7T-RB-GRAVEEN

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that a) it permitted excessive levels of deflection that would be disconcerting to homeowners and b) there are problems with footnotes f and g that were pointed out in testimony on the floor.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Cole Graveen, Raths, Raths & Johnson, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b,c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
All other structural members	L/240
Guards[f,g] Post (horizontal deflection) Top ~~Rail~~ of the guard (horizontal deflection) Top ~~Rail~~ of the guard (vertical deflection)	 H/12 H/24 + L/96 L/96

(*Portions of table not shown do not change)*

f. For the guard post, H shall be taken as the distance from the top of the ~~top rail~~ guard to the first point of support. The post deflection shall consider the rotation of the post support.

g. For the top of the guard ~~top rail~~, H shall be taken as the height of the ~~rail~~ guard and L shall be taken as the distance between edges of the post (vertical) supports. The deflection of the top ~~rail~~ of the guard is measured relative to the center of the two posts (vertical supports).

Commenter's Reason: This proposal, as modified, changes the deflection limits for guards in the IRC. The general deflection limit of L/240 which currently applies to guards under the *All other structural members* listing was most likely never intended to apply to guards and does not appear to be commonly applied to guards in design or code enforcement. Appropriate allowable deflections for guards, limits which are currently contained in ASTM and ICC-ES documents, are inserted into Table R301.7.

The modifications improve the original proposal by revising the text to more clearly indicate the proposed allowable deflection for guards.

The removal of the reference to the top rail addresses comments made at the public hearing that not all guards have rails. The text of the proposal was revised to simply refer to the top of the guard rather than the top rail.

The additional sentence in footnote f was added to make it clear that the post deflection includes the movement of the post and its support. If the effects of the support are not accounted for, a stiff post attached to a flimsy support could be considered to comply with the proposed limits even though the rotation at the bottom of the post would cause considerable deflection. Think of holding a long stick in your hand. Even slightly rotating your hand will cause the top of the stick to move. This effect cannot be ignored in deflection calculations.

In addition, the committee commented that they felt that this code change would permit excessive levels of deflection that would be disconcerting to homeowners. I disagree. The proposed limits are taken directly from ASTM E985, *Standard Specification for Permanent Metal Railing Systems and Rails for Buildings*, ASTM D7032, *Standard Specification for Establishing Performance*

Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), and ICC-ES AC273, *Acceptance Criteria for Handrails and Guards*. These documents are currently in use and I am unaware of any problems that have resulted from the application of these deflection limits.

It should be noted that if the current deflection limit of L/240 for *All other structural members* is applied to wood guards on common residential decks, as it should be per the current text of the IRC, it is highly likely that many of the typical wood guard constructions would not comply with L/240. The deflection of a typical mid-grade wood 4x4 post connected to a 2x10 band joist will exceed L/240 when both the bending deflection of the post and the rotation of the support is considered.

The proposed limits allow reasonable deflection of the guard post and the top of the guard while still ensuring that the guard will perform its intended function of preventing accidental falls. The proposed limits are taken from active published standards. The general deflection limit for *All other structural members* of L/240 was most likely never intended to apply to guards and this proposal clarifies this by inserting appropriate deflection limits for guards.

RB61-13

Final Action: AS AM AMPC____ D

RB64-13
R302.1

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

<u>Where non-residential buildings are located on the same *lot* containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.</u>

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Section R302.1 of the IRC is not clear as to when an imaginary line shall be used to determine protection due fire separation distance between dwellings and buildings other than dwellings or accessory structures thereto located on the same lot. Furthermore, the IBC in Chapter 5 allows for options other than assuming an imaginary line when determining fire separation distance.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

This code change makes a reference to the IBC to make clear that the protection due to fire separation distance shall be determined based on the requirements of the IBC for both a dwelling and the non-residential building that is regulated by the IBC. Without this code change IBC Section 503.1.2 may be construed to not apply. While the IRC has been designed to be a standalone code, the building official will be regulating the non-residential building based on the IBC and this code change provides a clean reference.

Cost Impact: None. This code change will not increase the cost of construction.

R302.1 #1-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that a) the term “non-residential” is not appropriate, b) the concept is good but the proposal should be changed to replace “non-residential” with “a structure built in accordance with the International Building Code,” and c) it is inappropriate to subject IRC buildings to the IBC for those standards.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

<u>Where structures constructed in accordance with the International Building Code are located on the same *lot* containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.</u>

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Commenter's Reason: Section R302.1 of the IRC is not clear on how to establish the imaginary line between when buildings conforming to the fire separation requirements of the IBC are located on the same lot as dwellings and their accessory conforming to the fire separation requirements of the IRC. Furthermore, the IBC in Chapter 5 allows for options other than assuming an imaginary line when determining fire separation distance.

IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

This code change makes a reference to the IBC to make clear that the protection due to fire separation distance shall be determined based on the requirements of the IBC for both a dwelling and the non-residential building that is regulated by the IBC. Without this code change IBC Section 503.1.2 may be construed to not apply. While the IRC has been designed to be a standalone code, the building official will be regulating the non-residential building based on the IBC and this code change provides a clean reference.

The fire hazards of buildings conforming to the international Building Code are more severe than those envisioned by the international Residential Code. While the requirements in the IBC due to fire separation distance may different, they address the same exterior wall and opening exposures and limitations on exterior projections in a similar fashion.

Public Comment 2:

Homer Maiel, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Where ~~non-residential buildings~~ <u>structures built in accordance with the International Building Code</u> are located on the same *lot* containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.

2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Commenter's Reason: This change is a code clarification more than anything else. The committee in Dallas disapproved it based on 1) using "non-residential building" in lieu of what is added here. 2) the committee also disapproved based on the fact that it is inappropriate to subject IRC buildings to IBC requirement. That was a misunderstanding on their part. IBC requirements are not brought into IRC. This code change is basically is saying that whatever that is built under IBC should abide with IBC requirements in terms of fire separation distance, projections, etc.

RB64-13

Final Action: AS AM AMPC____ D

RB65-13
R302.1

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fireseparation distance*.
2. Walls of *dwellings* <u>shall not be separated from</u> ~~and~~ *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Exception 2 of Section R302.1 of the IRC is not clear and can be read in two different ways. It may be read to exempt only accessory structures other than those discussed in exception 3 and 4 or all dwellings and structures accessory to any of them from the fire separation distance requirements. The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

It is not clear why the IBC and IRC are different with respect to the issue of fire separation. Neither IBC Chapter 6 nor Chapter 7 exempts structures from protections due to fire separation distance, however the IRC through this exception 2 can be construed to exempt a dwelling from being protected relative to an adjacent dwelling owned and operated by a different owner. The definition of fire separation distance in Section R202 includes the use of an imaginary line between buildings, and without this proposed code change the IRC may only require fire separation distance to buildings on the same lot that are not dwellings or accessory structures.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

R302.1 #2-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it was unclear and may be interpreted to require separation.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls ~~of~~, projections, openings or penetrations in walls located adjacent to the line used to determine the *fire separation distance* between *dwellings* and their *accessory structures* where located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Exception 2 of Section R302.1 of the IRC is not clear and can be read in two different ways. It may be read to exempt only accessory structures other than those discussed in exception 3 and 4 or all dwellings and structures accessory to any of them from the fire separation distance requirements. The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

It is not clear why the IBC and IRC are different with respect to the issue of fire separation. Neither IBC Chapter 6 nor Chapter 7 exempts structures from protections due to fire separation distance, however the IRC through this exception 2 can be construed to exempt a dwelling from being protected relative to an adjacent dwelling owned and operated by a different owner. The definition of fire separation distance in Section R202 includes the use of an imaginary line between buildings, and without this proposed code change the IRC may only require fire separation distance to buildings on the same lot that are not dwellings or accessory structures.

The proposed code change has been modified to clarify the original proposal that had an error as pointed out by the committee. The committee did not feel that the change was not appropriate.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB65-13

Final Action: AS AM AMPC____ D

RB66-13
R302.1

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.
6. <u>Detached patio covers and deck structures located greater than 5 feet from dwellings or lot lines.</u>

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

R302.1 #3-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it does not clearly address attached and detached decks and whether they are in the middle of the yard or adjacent to the building.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.
6. ~~Detached patio covers and deck structures located greater than 5 feet from dwellings or lot lines.~~ Exterior walls and openings on detached or attached patio covers and deck structures accessory to a dwelling that are located greater than 5 feet (1524.0 mm) from lot lines.

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and to separate unprotected combustible construction.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

The modified code change addresses fire separation relative to lot lines only since the IRC seems uninterested in requiring fire separation between dwellings and their accessory structures.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB66-13

Final Action: AS AM AMPC____ D

RB68-13
Table R302.1(1)

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	^{3} 5 feet
Projections	Fire-resistance rated	1 hour on the underside	^{3} 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	^{3} 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< ~~5~~ 3 feet
		None required	~~5~~ 3 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

Reason: This proposal reduces the penetration protection requirements for non sprinklered buildings to the same level as sprinklered buildings. The code currently allows walls 3 feet from a lot line to have openings up to 25% of the wall area but penetrations are required to be protected. This is senseless. The code overreacts to penetration protection. Foundation vents can be installed without limitation up to a lot line. Walls can have openings up to 25% of the area of the wall at 3 feet from the lot line. But install a penetration for a sill cock at 4 feet and it needs protection! This proposal creates some sense of reason to this section of the code.

Cost Impact: None

R302.1(1)T-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that, while doors and windows are generally visible, penetrations are not. Penetrations more readily allow a fire to enter into an assembly.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: There are significant inconsistencies in how walls, openings, penetrations, parapets, and other components of walls are treated when they approach the line used to determine fire separation distance.

For example, openings are prohibited in walls less than 3 feet from the line used to determine fire separation distance in both sprinklered and non-sprinklered buildings. But foundation vents are permitted in walls right up to the line used to determine fire separation distance. The main purpose of the vents is to allow free movement of air and this will include smoke, flames, and hot gases in fire situations. This is an inconsistency.

Roofs are prohibited from having openings within 4 feet of the parapet wall for townhouses (even though permitted in the IBC), yet foundation vents are permitted.

RB84 was approved by the IRC Committee. If that proposal is not challenged it will allow an unlimited amount of attic vents be placed in an exterior wall (gable) that could be adjacent the line used to determine fire separation distance. Like foundation vents, the sole purpose of these vents is to draw air into a space and vent it out someplace else. These openings can also readily draw in flames, smoke, and hot gases. Again, this is an inconsistency.

This proposal chips away at but a small piece of the problem. It will allow unprotected penetrations in walls that are 3 feet or more from the line used to determine the fire separation distance. These penetrations may be a water spigot or a cable TV wire. The code already allows openings to occupy 25% of the area of the wall. The code allows unlimited openings for foundation vents (and possible attic vents) in walls right up to the line used to determine fire separation distance. There are not suggested to be any limits on the number of penetrations because realistically the number and size of common penetrations will never exceed the potential area of openings, foundation vents, and attic vents. Penetrations must be sealed for weather resistance and protection against intrusion by insects and rodents. This proposal will not result in gaping holes that would allow a fire to penetrate deep into the framework of a dwelling.

Let's look at a real world example. I construct a new building 4 ½ feet from the lot line. I can have an unlimited area of foundation vents. I can have up to 25% of the wall in openings. These openings are not required to have doors or glazing in them. They can be gaping holes in the walls. By RB84 I can have unlimited attic vents. But, if I install a water spigot in this wall, I need to make a trip down to the local building supply store and purchase a tube of expensive fire stop material of which I will use a small fraction and throw the rest away. Explain the rationale to your mayor or other elected official. Would you undergo the effort to write a correction notice and follow it up with a complaint to the local courts? Would you feel justified in explaining the need to seal a cable TV wire next to a large opening in the wall? Of course not. It isn't enough just to write a correction notice. You need to feel confident in bringing an action against the individual in court.

The IRC Committee suggests that penetrations more readily allow fire to penetrate an assembly than an opening would! The assembly will almost always have the stud cavity filled with insulation. The opening, foundation vent, or attic vent provides ample openings allowing free movement of air through them.

It is simply overregulation to require protection of these penetrations when one could have large unprotected openings nearby. Ironically, some of the penetrations labeled as a problem are sometimes run through windows and vents.

Public Comment 2:

Steve Orlowski, representing National Association Of Home Builders, requests Approval as Submitted.

Commenter's Reason: The committee's reason for disapproval misses the point that the proponent was attempting to make. There is a need for the code to make reasonable concessions regarding penetrations of the fire-resistant rated assemblies for small penetrations such as sill cocks, dryer vent terminations, mechanical draft terminals and electrical equipment. Keep in mind that these are small penetrations, often smaller then foundation vents which are currently exempt from complying with Table R302.1(1).

RB68-13

Final Action: AS AM AMPC____ D

RB69-13
Table R302.1(1), R302.1(2)

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	³ >2 feet to < 5 feet distance to projection
	Not fire-resistance rated	0 hours	³ >5 feet distance to projection
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

TABLE R302.1(2)
EXTERIOR WALLS-DWELLINGS WITH FIRE SPRINKLERS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet[a]
Projections	Fire-resistance rated	1 hour on the underside	2 feet[a] distance to projection
	Not fire-resistance rated	0 hours	3 feet distance to projection
Openings in walls	Not allowed	N/A	< 3 feet

<table>
<tr><th colspan="2">EXTERIOR WALL ELEMENT</th><th>MINIMUM
FIRE-RESISTANCE RATING</th><th>MINIMUM FIRE SEPARATION DISTANCE</th></tr>
<tr><td></td><td>Unlimited</td><td>0 hours</td><td>3 feet[a]</td></tr>
<tr><td rowspan="2">Penetrations</td><td rowspan="2">All</td><td>Comply with Section R302.4</td><td>< 3 feet</td></tr>
<tr><td>None required</td><td>3 feet[a]</td></tr>
</table>

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable

a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

Reason: Table R302.1(1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring "from the building face" to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection. The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, he famous 1/3 to ½ the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user.

This code change is being offered in a text format or tabular format in separate code changes to allow the membership a choice in the way that the regulations are adopted into the 2015 IBC.

Cost Impact: None. This code change will not increase the cost of construction.

R302.1(1)T-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proposed information is already covered in the code and, therefore, is unnecessary.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Commenter's Reason: The original proposal is being re-submitted as proposed based on a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change. Committee feedback has been incorporated into the proposed code change. We disagree with the committee reason. Table R302.1 (1) were developed in the 2009 IRC to consolidate the requirements based on fire separation distance into a tabular format. However it has become clear that certain items in the table are incorporated within an exterior wall (openings, penetrations, wall construction) and as a consequence the wall position drives requirements. Projections on the other hand are different as the code intends to limit how close they can get to a lot line or imaginary line where applicable. As it currently exists in the 2009 IRC an exterior wall located 7 ft from a lot line may include projection that encroach into the 5 ft or 3 ft zone used to determine fire separation distance and a permit applicant can insist that the combustible projection can be non-rated and can project as close as desired to lot line.

The code change as proposed merely clarifies that the quantity in column 3 is triggered based on the distance to the projection rather than the wall it projects from. Alternatively the table needs to be restructured to pull out projections into a separate section as currently exists in the IBC. Code change RB71-13 was approved by the committee and addresses another deficiency in the table by prohibiting projections less than 2 ft and it is the intent of the RB66 proponent that the code correlation committees consolidate the two code changes.

Note staff: A typographical error appears in the submitted table R302.1(1) where the superscript 3 precedes the text in rows 2, 3 and 4 in column 3 and should not be included in the code change.

Public Comment 2:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Submitted.

Commenter's Reason: Commenter's Reason: The proponent is making a very good case that definition of "Fire Separation Distance" is "distance measured from the building face.."

This proposal clarifies the distance, in case of projection, should be measured FROM the edge of the projection. The committee was not correct in saying that the proposed information is already covered in the code.

RB69-13

Final Action: AS AM AMPC____ D

RB72-13
Table R302.1(1)

Proposed Change as Submitted

Proponent: Maureen Traxler, Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area per story	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

Reason: The IRC is ambiguous about how to calculate the percentage of openings allowed in exterior walls. The limitation could be calculated either as a percentage of the area of the entire exterior wall, or as a percentage of each story. This proposal requires that openings in exterior walls be calculated for each story. This method is consistent with IBC Section 705.8.1. Consider this example of the potential consequence of not using the proposed interpretation. If the area of openings was allowed to be calculated based on the entire face of the wall, on a 3-story building the first story of a building 3 feet from a property line could have 75% openings if there were no openings in the other 2 stories.

Cost Impact: None

R302.1(1)T-RB-TRAXLER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it limits design flexibility and is not appropriate for the residential code. If the intent is to limit, it should limit each story.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Submitted.

Commenter's Reason: This proposal is needed to make the code requirement clear. In addition to proponent's example in her statement of reason, another example can be cited here. What if the second floor is popped out for couple of feet and it is has less FSD than the first floor? This is another reason for adding "per story" in the code. The committee's reason for disapproval was not a sound reason.

Public Comment 2:

C. Ray Allshouse AIA, CBO, City of Shoreline, Washington, representing WABO – Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R302.1(1)
EXTERIOR WALLS

EXTERIOR WALL ELEMENT		**MINIMUM FIRE-RESISTANCE RATING**	**MINIMUM FIRE SEPARATION DISTANCE**
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area ~~per~~ in any story	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

Commenter's Reason: In response to the Committee's reason statement for disapproval suggesting that this change should limit the extent of maximum openings at each story, it is proposed that identical language be lifted from the IBC section as reflected by this public comment. This will remove any doubt as to how this limitation is to be applied and attains consistency with the IBC. This also removes what otherwise can be construed as a serious loophole to an important fire safety provision of the code. This proposed change provides clarification language to ensure an equivalent fire protection installation for a comparable condition.

RB72-13
Final Action: AS AM AMPC____ D

RB74-13
R302.1.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

<u>**R302.1.1 Exterior stairways.** Exterior stairways located above grade shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines* and from other buildings on the same lot.</u>

<u>**Exception:** Where the *exterior walls* and openings on the adjacent building on the same lot are protected in accordance with Table R302.1(1) based on *fire separation distance.*</u>

Reason: Section R302.1 of the IRC is not clear insofar as exterior stairways located in close proximity to lot lines. The IBC Section 1026.5 requires a fire separation distance of not less than 10 ft since it considers exterior stairways to be exits. The IRC does not fire protection for stairways and as a consequence a dwelling unit located on the second floor served independently with an exterior stairway can be served with a stairway located at a fire separation distance of 0 ft. This lack of protection to a combustible exterior exit element is not prudent as has been demonstrated by full scale fire testing for building exposures.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and by extension the reason that it is necessary to protect or separate elevated exterior exit ways.

Cost Impact: This code change will have a minimal increase to the code of construction since lad use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

R302.1.1 (NEW) #1-RB-FATTAH

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it needs more work. It appears that it may have been developed to address the exits for stacked two-family dwellings, but it has other obvious implications.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

R302.1.1 Exterior stairways. ~~Exterior stairways located above grade shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines* and from other buildings on the same lot.~~ <u>Exterior exit stairways located above grade and serving the primary means of egress door to a dwelling shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines*.</u>

~~**Exception:** Where the *exterior walls* and openings on the adjacent building on the same lot are protected in accordance with Table R302.1(1) based on *fire separation distance.*~~

Commenter's Reason: Section R302.1 of the IRC is not clear insofar as exterior stairways located in close proximity to lot lines. IBC Section 1026.5 requires a fire separation distance of not less than 10 ft since it considers exterior stairways to be exits. The IRC does not require fire protection for stairways and as a consequence a dwelling unit located on the second floor served independently with an exterior stairway can be served with a stairway located at a fire separation distance of 0 ft. Additionally buildings located on sloping sites may provide access to the public way with a stairway that is not directly supported on grade and may also be located immediately adjacent to a lot line. This lack of protection to a combustible exterior exit element is not prudent as has been demonstrated by full scale fire testing for building exposures. In addition to providing protection for the egress path, the proposed code change provided protection for the stairway itself.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and by extension the reason that it is necessary to protect or separate elevated exterior exit ways.

The committee did not feel that the proposed code change was without merit however the reason statement was not consistent with the original proposal.

Cost Impact: This code change will have a minimal increase to the code of construction since lad use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB74-13

Final Action: AS AM AMPC____ D

RB75-13
R302.1.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

<u>**R302.1.1 Attached and detached accessory structures.** Accessory structures such as patio covers and deck structures, whether attached or detached, shall be located not less than a fire separation distance of 5 ft or more from lot lines.</u>

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in “NIST Technical Note 1600 - Residential Structure Separation Fire Experiments” (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that “… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft).” The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

Cost Impact: This code change will have a minimal increase to the cost of construction since lad use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

(NEW) #2-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that accessory structures and decks should have more flexibility than allowed by the proposal.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Commenter's Reason: The proponent was not able to attend the Code Development Hearing to explain the proposed code change. Committee feedback has been considered based on a review of the published REPORT OF THE PUBLIC HEARING.

Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IRC unlike the IBC does not appear to be interested in the exposures to/from their accessory structures located on the same lot. Patio covers can include significant combustible loading due to plastics and upholstered furniture as well as what is typically constructed of unprotected combustible framing. Deck structures may or may not include patio covers and pose ladder fuels exposing a dwelling to which the deck structure is attached from an adjacent building that can be a building regulated by the IBC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf) concludes that "… an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot and that those accessory structures should at least be separated from lot lines as if they were dwellings.

RB75-13

Final Action: AS AM AMPC____ D

RB76-13
R302.1.1 (New)

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC(afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

R302.1.1 Projections. Projections shall be located a minimum distance from the line used to determine fire separation distance based on Table R302.1(1) and Table R302.1(2). Projections shall be fire resistance rated where required by Table R302.1(1) and Table R302.1(2).

Reason: Table R302.1(1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring "from the building face" to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection. The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, he famous 1/3 to ½ the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user.

This code change is being offered in a text format or tabular format in separate code changes to allow the membership a choice in the way that the regulations are adopted into the 2015 IBC.

Cost Impact: None. This code change will not increase the cost of construction.

R302.1.1 (NEW) #3-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the language it contained was redundant.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Reason: We respectfully disagree with the committee that this is redundant language. We submitted RB69 and RB76 to allow the membership a choice however we favor RB76.

Table R302.1 (1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring “from the building face” to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection.

The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, the famous projection encroachment of 1/3 to ½ into the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user. The 2009 IBC created a tabular form to display fire separation protection ad inadvertently mixed the separation of items protecting the exterior wall under consideration, as well as penetrations or openings in such wall with exterior wall projections that need to be protected based on how far they are from a lot line or imaginary line.

RB76-13

Final Action: AS AM AMPC____ D

RB77-13
R302.2

Proposed Change as Submitted

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

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

> **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. ~~The wall shall be rated for fire exposure from both sides. and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~

Reason: This language is redundant and needs to be deleted because it is already covered in the next section, R302.2.1, Continuity**.**

"The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*."

The language about electrical installations is not needed. This section is about fire-resistance-rated construction, not about how to wire a home.

Cost Impact: None

R302.2-RB-ARCHER

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the electrical references in the code should not be deleted and that the existing language is not redundant.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

> **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the

common wall. The wall shall be rated for fire exposure from both sides~~ and shall extend to and be tight against exterior walls and the underside of the roof sheathing~~. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

Commenter's Reason: The redundant portion of this section, which is repeated in Section R302.2.1, is deleted. The rest of the section is remaining unchanged.

RB77-13

Final Action: AS AM AMPC____ D

RB79-13
R302.2, R302.2.4

Proposed Change as Submitted

Proponent: Jeffrey M. Shapiro, representing IRC Fire Sprinkler Coalition (jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exceptions:

1. Where a fire sprinkler system in accordance with Section P2904 is provided, a~~A~~ common 1-hour-fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, a common 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual *townhouse* shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouses* separated by a common ~~1-hour fire resistance-rated~~ wall as provided in Section R302.2, Exceptions 1 or 2.

Reason: The 1-hour separation requirements in these sections were reduced from 2-hour ratings in prior editions of the IRC based on the assumption that fire sprinklers mandated by the IRC would be present in all townhouses. Because some jurisdictions are amending the IRC to remove the fire sprinkler requirement, it is essential that the IRC provide for townhouse separation fire ratings to be returned to 2-hours if sprinklers are not provided. No justification, other than sprinklers, was ever provided for allowing a 1-hour separation, and this reduced rating is inappropriate for non-sprinklered buildings.

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

R302.2-RB-SHAPIRO

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that a) it takes care of an important omission in the code related to fire sprinkler systems and b) it addresses the many ways in which jurisdictions adopt the code and modify sprinkler requirements.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jonathan Humble, representing American Iron and Steel Institute; Wayne Jewell, Green Oak Charter Township, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.2 Townhouses. ~~Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.~~ Common walls separating townhouses shall be assigned a fire resistance rating in accordance with Section R302.2 Item 1 or Item 2. The common wall shared by two *townhouses* shall be constructed without plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

~~Exceptions:~~

1. Where a fire sprinkler system in accordance with Section P2904 is provided, ~~a~~ the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263**.** ~~is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, ~~a~~ the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263**.** ~~is permitted for townhouses where such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~

R302.2.4 Structural independence. Each individual *townhouse* shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouses* separated by a common 1-hour fire resistance-rated wall as provided in Section R302.2, Items ~~Exceptions~~ 1 or 2.

Commenter's Reason: This public comment proposes to further modify RB79-13 as follows:

Deletion of the original charging language:
When this proposal was developed there was no longer a need to retain the reference to Section R302.1 and Table R302.1 as the proposed language now covers the fire resistance requirements in R302.2. As a result, we propose to delete that language as part of this modification since it is redundant and rely on the new text to articulate the fire resistance requirements for common walls.

Addition of instructions:
We are proposing new charging language which allows the user to choose the design and construction of the common wall. This is consistent with the RB79-13 and the choice allowed in the exceptions.

Removal of duplicative language in the exceptions:
We also propose the removal of the construction limitations language from the two parts of RB79-13 as it is duplicative, and instead suggest it be relocated into the charging section, thus stating the limitations only once.

Exceptions to Parts:
We propose that the exceptions be labeled as items in order to coordinate with the other modification concerning the revised charging language where the user is allowed to choose a 1-hour or 2-hour rated wall design.

RB79-13

Final Action: AS AM AMPC____ D

RB81-13
R302.2, R302.2.4, R313.1, R313.2 and R313.3 (New)

Proposed Change as Submitted

Proponent: Jason Thompson, P.E., National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

> **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for *townhouses* with automatic fire sprinkler systems in accordance with Section R313.1 if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common ~~1-hour fire-resistance-rated~~ wall as provided in Section R302.2 or Section R313.3.

R313.1 Townhouse automatic fire sprinkler systems. Except as provided in Section R313.3, ~~A~~ an automatic residential fire sprinkler system shall be installed in *townhouses*.

> **Exception:** An automatic residential fire sprinkler system shall not be required when *additions* or *alterations* are made to existing *townhouses* that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904.

R313.2 One- and two-family dwellings automatic fire systems. Except as provided in Section R313.3, ~~A~~ an automatic residential fire sprinkler system shall be installed in one- and two-family *dwellings*.

> **Exception:** An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential sprinkler system.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.3 Automatic fire sprinkler system alternative. Where an automatic fire sprinkler system is not required to be installed by the adopting authority, the following requirements shall be met.

1. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* shall comply with Table R302.1(1);
2. *Townhouses* constructed with a common wall assembly in accordance with the exception to Section R302.2 shall have a minimum 2-hour fire-resistance-rating. The common wall shall not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations for electrical outlet boxes shall be in accordance with Section R302.4.

Reason: Where adoption of the 2009 and 2012 editions of the International Residential Building Code have been considered, many adopting authorities have made modifications to negate the requirement for mandatory automatic fire sprinkler protection. In some instances the adopting authorities have re-instated the previous requirements for the fire resistance for exterior walls for dwellings and the fire resistance for common walls separating townhouses to those established in the 2006 edition. However, some jurisdictions negated the mandatory automatic fire sprinkler protection but did not require the previous fire resistance requirements for these exterior walls and common walls resulting in reduced fire safety for the occupants and property.

This proposal provides an alternative within the code to permit adopting authorities an option to permit townhouses and one- and two-family dwellings to be unsprinklered provided the fire resistance rating for exterior walls and common walls are established at the code prescribed levels prior to the 2009 IRC.

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

R302.2 #2-RB-THOMPSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal a) because the proponent requested disapproval and b) based on prior committee action on RB79.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards, requests Approval as Submitted.

Commenter's Reason: Where adoption of the 2009 and 2012 editions of the International Residential Building Code have been considered, many adopting authorities have made modifications to negate the requirement for mandatory automatic fire sprinkler protection. In some instances the adopting authorities have re-instated the previous requirements for the fire resistance for exterior walls for dwellings and the fire resistance for common walls separating townhouses to those established in the 2006 edition. However, some jurisdictions negated the mandatory automatic fire sprinkler protection but did not require the previous fire resistance requirements for these exterior walls and common walls resulting in reduced fire safety for the occupants and property.

During the first public hearing the IRC-B Code Development Committee approved Code Change RB79-13 which accomplished the same intent as this proposal. If the membership determines the format of RB79-13 is not acceptable then this proposal provides alternative language within the code to permit adopting authorities an option to permit townhouses and one- and two-family dwellings to be unsprinklered provided the fire resistance rating for exterior walls and common walls are established at the code prescribed levels prior to the 2009 IRC.

RB81-13

Final Action: AS AM AMPC____ D

RB83-13
302.2.1

Proposed Change as Submitted

Proponent: C. Ray Allshouse AIA, CBO, City of Shoreline, WA, representing the Washington Association of Building Officials Technical Code Development Committee (rallshouse@shorelinewa.gov)

Revise as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. <u>Where a *story* extends beyond the *exterior wall* of a *story* below, one of the following shall apply:</u>

1. <u>The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper *story*; or</u>
2. <u>The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302.</u>

Reason: Current townhouse code language is vague regarding the continuity of fire-resistance-rated assemblies, specifically in those instances where an upper story extends beyond the face of the wall immediately below. This represents a potential breach in the integrity of the fire resistance rated construction deemed necessary to ensure full dwelling unit separation in townhouse configured construction. This change clarifies the needed protection requirements. It is not uncommon for local zoning ordinances to include provisions specifically intended to break up continuous building facades as well as the large scale presentation of multifamily buildings. Developers typically utilize offsets between units to achieve these building modulation requirements that frequently result in this configuration. This proposed change provides language to cover this condition thereby helping ensure that the required dwelling separation is achieved.

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

R302.2.1-RB-ALLSHOUSE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the fire separation requirement would extend to the whole building and not just to a perpendicular wall. The proponent should come back with a public comment and graphics to support the proposal.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

C. Ray Allshouse AIA, CBO, City of Shoreline, Washington, representing WABO – Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. Where a *story* extends beyond the *exterior wall* of a *story* below, one of the following shall apply:

1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper *story*; or
2. The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302 <u>for a perpendicular distance of 4 feet (1219 mm) from the separating wall</u>.

Commenter's Reason: The code change proposal language has been revised in consideration of concerns raised by the Committee regarding a potential unintended consequence of requiring fire separation of the whole building and their additional recommendation to provide graphics in support of the proposal. The original proposal uses language consistent with that covering parapets in the immediately following section regarding extensions of separating walls; so this portion of the requirement is sound. However, questions were raised in testimony as to the extent of the protection on the underside of the exposed floor-ceiling assembly. A further referral to existing parapet construction exception language provides the basis for a minimum protection of 4 feet. The attached graphics are provided to help the assembly understand the two available options deemed necessary to ensure continuity of fire separation proposed by this change -- Items 1 and 2 depicted by Figures 1 and 2, respectively

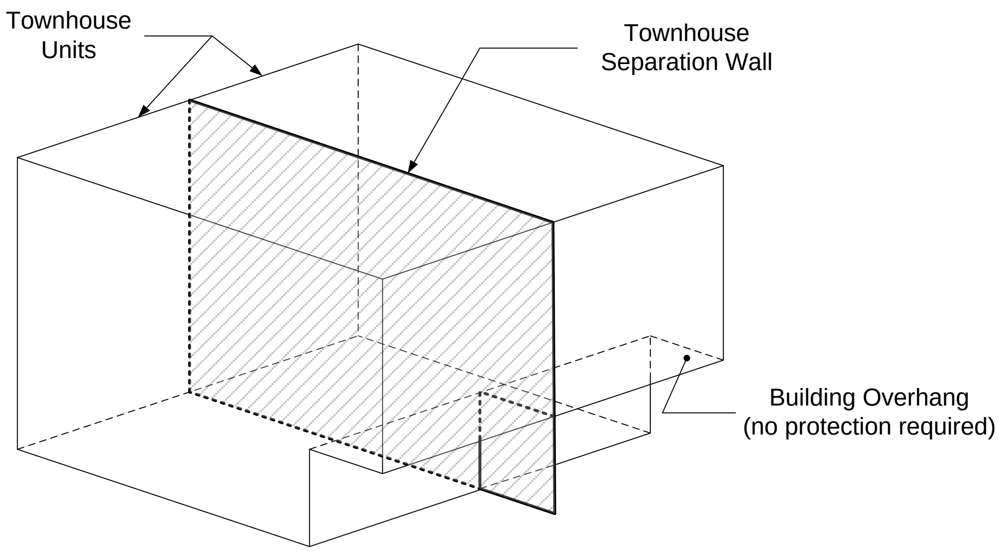


FIG. 1 – EXTENDED SEPARATION WALL

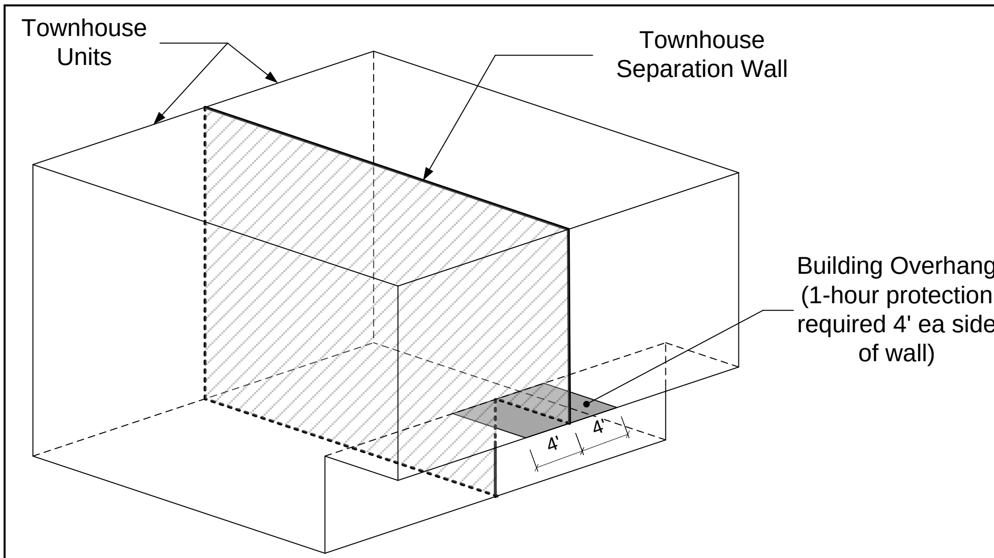


FIG. 2 – OVERHANG PROTECTION

Public Comment 2:

Lee Kranz, representing City of Bellevue, Washington and self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. Where a *story* extends beyond the *exterior wall* of a *story* below, one of the following shall apply:

1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper *story*; or
2. The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302. <u>The protection shall extend the full depth of the soffit, but need not extend more than 4 feet on each side of the separating wall.</u>

Commenter's Reason: The proposed language has been revised in consideration of concerns raised by the Committee regarding a potential unintended consequence of requiring fire separation of the whole soffit area of the projecting floor or element above. It is acknowledged that protection of the entire underside of the exposed soffit assembly is not necessary and ought to be limited. The proposed text provides a reasonable alternative to extending the separation wall all the way out to the outside edge of the story or projecting element above to prevent a conflagration fire from occurring. This provision will provide clear direction in the design of the fire separation to keep a fire from spreading from one unit to another and give the fire department adequate time to arrive and put the fire out.

RB83-13

Final Action: AS AM AMPC____ D

RB84-13
R302.1

Proposed Change as Submitted

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB) (sorlowski@nahb.org)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation <u>and attic</u> vents installed in compliance with this code are permitted.

Reason: After reviewing several UL listed fire-resistant rated assemblies, the NAHB discovered a problem between attempting to provide adequate attic ventilation to certain roof types (hip roofs, cathedral ceilings, etc) and achieving the one-hour fire resistance rating. The UL listed roof assemblies do not allow for any openings in the rated assembly for roofs, thereby creating a problem for proper roof ventilation as required in section R806. The NAHB proposes this code change to balance the needs of both adequate fire protection for exposure fires and proper ventilation of the attic. Under the 2012 IRC, projections are not permitted within two feet of the fire separation distance and the required ventilation opening for attics are minimal, 1/150 of the area of the vented space. The IRC also currently allows 25% of the wall space to be occupied by windows in exterior walls that are within 3'-0" of the fire separation distance. The IRC currently exempt foundation vents from being protected. NAHB suggest that due to the minimal openings required to provide ventilation in the attic, these openings should also be exempted.

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

R302.1-RB-ORLOWSKI

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because: they felt that attic vents are necessary; this does not compromise fire safety significantly; and because representatives of NAHB testified that less than 1% of fires are related to fires entering adjacent building through soffit vents.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Disapproval.

Commenter's Reason: It does not make any sense to allow unlimited attic vents when located close to property lines and when fire rated construction is required.

The reason statement and testimony talked to the fact that these vents are typically not very large and are needed to satisfy the other code requirement for attic ventilation but the fact of the matter is the new language does not restrict the number nor the size so there could be many more than the minimum. I also understand the proponent was comparing this to the allowance to have unlimited size foundation vents (in a crawl space wall) but I would argue that these are very low to the ground and attic vents are up high and in the soffit overhang. If there was a fire on adjacent property this would be the perfect place for the fire to spread to this house and right into the attic space through these attic vents which are installed on the horizontal soffit.

It is very easy (and not expensive) to provide attic vents located on the slope of the roof located up off the wall line and these will perform adequately to meet the attic ventilation requirements. It would also make it easier for the builders who are in the climate zones which require the higher insulation depths since they would not have to use the baffles to allow the soffit vents work.

RB84-13

Final Action: AS AM AMPC____ D

RB86-13
R302.2.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

   Exception: A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls ~~and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the exterior or common walls~~.

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.

Reason: The language proposed to be deleted was added in last code cycle and it was argued by the proponent that the change put the IRC in sync with the IBC. That is, it was argued that openings were not permitted within a certain distance of a townhouse separation wall in the IBC and the proposal made the IRC consistent with the IBC. This proposal was disapproved by the ICC IRC Committee with the following comment: "**Committee Reason:** This change would impose severe restrictions on penetrations at the roof. This does not mirror the IBC requirement on this issue." The IRC Committee action was right. However the membership approved the code change anyway.

The result is a more restrictive requirement in the IRC than in the IBC for the exact same application. This proposal deletes the conflicting language so that the IRC and IBC rules are again the same.

This proposal is necessary to maintain equivalencies for the same type of structures regulated by the IBC and IRC. The following language is from the IBC for information only (note the bold italicized text). Note that there is no regulation of openings under method 5.

2012 IBC

705.11 Parapets. Parapets shall be provided on *exterior walls* of buildings.

Exceptions: A parapet need not be provided on an *exterior wall* where any of the following conditions exist:

1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of *fire separation distance*.
2. The building has an area of not more than 1,000 square feet (93 m2) on any floor.
3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials.
4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided:
   4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220

mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.

4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction.

4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire resistance-rated *exterior wall* for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.

4.4. The entire building shall be provided with not less than a Class B roof covering.

5. In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the exterior wall shall be permitted to terminate at the underside of the roof sheathing or deck in Type III, IV and V construction, provided:

5.1. The roof sheathing or deck is constructed of approved noncombustible materials or of fire-retardant-treated wood for a distance of 4 feet (1220 mm); or

5.2. The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm).

6. Where the wall is permitted to have at least 25 percent of the *exterior wall* areas containing unprotected openings based on *fire separation distance* as determined in accordance with Section 705.8.

There are no restrictions on openings in the roof under item #5 in the IBC. The IRC should follow suit.

Cost Impact: None

R302.2.2.2-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the existing four foot separation requirement for openings is appropriate in relation to the parapet. Parapets are different in the IRC and IBC. It would be too easy for a fire in the IRC to jump from skylight to skylight.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: This proposal would delete the prohibition of openings in roofs adjoining a parapet for townhouse construction. The IRC has some conflicting exterior wall requirements and this is one of them.

The IBC does not prohibit openings in roof areas adjacent to a parapet ***that is an extension of an exterior wall*** for R-2 and R-3 occupancies (apartment houses, hotels, one and two family dwellings, and townhouses) of Types III, IV, and V construction. The IRC does prohibit openings so the IRC is more restrictive. For the IRC to prohibit openings is over-regulation.

There have been many statements made regarding the validity of the claim that the IBC does not regulate openings adjacent to parapets. That is understandable because there are two sections in the IBC that address parapets and some folks may be reading the wrong section.

The IBC sections are 705.11 and 706.6. IBC section 705.11 is the section of the IBC that regulates exterior walls and is the companion section of IRC Section R302.2.2. ***Only IBC Section 705.11 and IRC Section 302.2.2 regulate exterior walls.***

Let's be clear about this. IRC Section R302.2 regulates these walls as ***exterior walls***. The text that follows leaves no doubt: "**R302.2 Townhouses.** Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls."

The other IBC section that requires and regulates parapets is Section 706.6 which is the section on ***fire walls***. Fire walls separate buildings on the same lot and are not regulated in the same manner as exterior walls. Fire walls ***do restrict*** openings adjacent the fire wall but comparing the fire wall requirements in the IBC and the property line requirements of the IRC is comparing apples to oranges. The appropriate comparison is R302.2.2 in the IRC and 705.11 in the IBC.

The IRC Committee disapproved this code change for a number of reasons (see following). First, the reason statement says parapets are different in the IRC and IBC. A side by side comparison follows. The two codes are identical. There are no differences in parapet requirements for buildings of similar use and construction type. It is apparent that some committee members may have been directed to the wrong IBC section.

Second, the reason statement says it would be too easy for a fire in the IRC to jump from skylight to skylight. There was no testimony given to suggest that fires react differently depending on which code was used. Skylights are permitted in both the IRC and IBC.

But most puzzling is the action taken to deny this proposal coming on the heels of RB84 that was approved by the Committee. RB84 (assuming it survives the public comment period) will allow unlimited openings when used for attic ventilation in walls of all structures, not just townhouses, adjacent the line used to determine fire separation distance. The illustration following shows the area where unlimited attic vents would be allowed. This creates the situation where attic vents would not be permitted within 4 feet of the edge of the roof but would be unregulated in the wall that the parapet alternate is intended to protect! This is a blatant and unexplainable inconsistency.

A fire moving across the roof of one building doesn't need to breech an opening and burn down into the attic below. It can enter the adjoining attic through the unlimited vent openings.

The committee action statement for RB84 stated that NAHB Representatives had stated less than 1% of fires entered adjacent buildings through soffit vents. If less than 1% of fires enter through soffit vents, it stand to reason that very few, if any, enter an adjacent building through roof openings.

An owner can construct townhouses under the IBC and will not be limited by openings adjacent property line walls and they can be of greater height than under the IRC. Under the IRC those same openings are not permitted.

There is no justification for the IRC to be more restrictive than the IBC for these circumstances. When this text went into the code the only reason given was for consistency with the IBC. That reason was never true or the codes were misunderstood and the following comparison illustrates that. This unnecessary requirement needs to go and consistency must exist.

RB86-13

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the existing four foot separation requirement for openings is appropriate in relation to the parapet. Parapets are different in the IRC and IBC. It would be too easy for a fire in the IRC to jump from skylight to skylight.

Assembly Action: **None**

IRC	IBC
R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following: 1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces. 2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface. **Exception:** A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant-treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the common walls. 3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.	**705.11 Parapets.** Parapets shall be provided on *exterior walls* of buildings. **Exceptions:** A parapet need not be provided on an *exterior wall* where any of the following conditions exist: 1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of *fire separation distance*. 2. The building has an area of not more than 1,000 square feet (93 m^2) on any floor. 3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials. 4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided: 4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220 mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall. 4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction. 4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire resistance-rated *exterior wall* for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall. 4.4. The entire building shall be provided with not less than a Class B roof covering. 5. In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the *exterior wall* shall be permitted to terminate at the underside of the roof sheathing or deck in Type III, IV and V construction, provided: 5.1. The roof sheathing or deck is constructed of *approved* noncombustible materials or of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm); or 5.2. The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm). 6. Where the wall is permitted to have at least 25 percent of the *exterior wall* areas containing unprotected openings based on *fire separation distance* as determined in accordance with Section 705.8.

RB84-13

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because: they felt that attic vents are necessary; this does not compromise fire safety significantly; and because representatives of NAHB testified that less than 1% of fires are related to fires entering adjacent building through soffit vents.

Assembly Action: **None**

RB86-13

Final Action: AS AM AMPC____ D

RB88-13
R302.4.2

Proposed Change as Submitted

Proponent: Mark Nowak, M Nowak Consulting LLC, representing Steel Framing Alliance

Revise as follows:

R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

Exceptions:

1. Membrane penetrations of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m^2) in area provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m^2) in any 100 square feet (9.29 m)^2 of wall area. The annular space between the wall membrane and the box shall not exceed $^1/_8$ inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:
   1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities;
   1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
   1.3. By solid fire blocking in accordance with Section R302.11;
   1.4. By protecting both boxes with listed putty pads; or
   1.5. By other listed materials and methods.
2. Membrane penetrations by listed electrical boxes of any materials provided the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed $^1/_8$ inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
   2.1. By the horizontal distance specified in the listing of the electrical boxes;
   2.2. By solid fireblocking in accordance with Section R302.11;
   2.3. By protecting both boxes with listed putty pads; or
   2.4. By other listed materials and methods.
3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal escutcheon plate.
4. <u>Ceiling membranes of 1- and 2-hour fire-resistant assemblies are permitted to be interrupted by wall assembly double wood top plates, or steel top tracks complying with Sections 702.3.3 or R603.2.1, where the wall assembly complies with all of the following:</u>
   <u>4.1 The wall assembly is sheathed with Type X gypsum board,</u>
   <u>4.2 All penetrations through the top plate or track are protected in accordance with Section R302.4.1 and</u>
   <u>4.3 The ceiling membrane is installed tight to the top plate or track.</u>

Reason: This proposal is consistent with approved proposal FS76-12 for the 2015 IBC. However, it is inclusive of both wood top plates and steel top tracks. This proposal is needed only for the stacked duplex case in the IRC where the floor may be supported by a wall having at least equivalent fire resistance (R302.3.1) or where non-loadbearing walls are framed prior to installation of the membrane as is often necessary to route mechanical and electrical equipment. Thus, penetrations through the top plate or track are required to be protected per Section R302.4.1 to maintain the integrity and intent of the fire resistance requirement of floors separating stacked duplexes.

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

R302.4.2-RB-NOWAK

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal because the proponent requested disapproval and because the committee felt that the proposal might work for 1-hour ratings, but not 2-hour ratings. Penetrations in and out of the wall and through floor assemblies need to be addressed. This should be improved and brought back in the public comment period.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

Exceptions:

1. Membrane penetrations of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m2) in area provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m2) in any 100 square feet (9.29 m)2 of wall area. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:
   - 1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities;
   - 1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
   - 1.3. By solid fire blocking in accordance with Section R302.11;
   - 1.4. By protecting both boxes with listed putty pads; or
   - 1.5. By other listed materials and methods.
2. Membrane penetrations by listed electrical boxes of any materials provided the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed 1/8 inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
   - 2.1. By the horizontal distance specified in the listing of the electrical boxes;
   - 2.2. By solid fireblocking in accordance with Section R302.11;
   - 2.3. By protecting both boxes with listed putty pads; or
   - 2.4. By other listed materials and methods.
3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal escutcheon plate.
4. Ceiling membranes of 1- ~~and 2-~~hour fire-resistant assemblies are permitted to be interrupted by wall assembly double wood top plates, ~~or steel top tracks complying with Sections 702.3.3 or R603.2.1~~, where the wall assembly complies with all of the following:
   - 4.1. The wall assembly is sheathed with Type X gypsum board,
   - 4.2. All penetrations through the top plate ~~or track~~ are protected in accordance with Section R302.4.1 and
   - 4.3. The ceiling membrane is installed tight to the top plate ~~or track~~.

Commenter's Reason: As I testified at the Dallas hearings there are no approved tested firestopping assemblies that can be used on a steel top plate that does not have a gypsum membrane that extends over the top of the steel top plate. The balance of the original code change is a good one in that it will match the same language that is now in the 2012 and 2015 IBC. I was the original proponent of getting this type of language into the IBC and encourage the membership in approving this code change as modified above.

I am also proposing to delete the reference to a 2 hour rated assembly since you would never have this condition under the IRC – this would effectively only apply to a stacked duplex which would have a 1 hour rated horizontal assembly.

Public Comment 2:

Dennis Pitts, representing American Wood Council, requests Disapproval.

Commenter's Reason: In residential construction it is common for joists to bear directly on the top plates of the wall below. Continuity of a fire-rated floor assembly is assumed from plate to plate, and there are no code provisions requiring uninterrupted continuity at the floor/wall intersection. If the wall/floor intersection needs protection, that question should be addressed more directly. This is adding an exception to a code requirement that doesn't exist, and by so doing implies that the intersection is already regulated as a membrane penetration. However, it is not, nor should it be.

If special protection is needed for steel top plates in this application, a positive requirement for their protection could be introduced into the code.

RB88-13
Final Action: AS AM AMPC____ D

RB90-13
R302.5.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1-3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1-3/8 inches (35 mm) thick, or 20-minute fire-rated doors~~, equipped with a self-closing device~~.

Reason: The IRC Committee and the ICC membership has consistently opposed closers on the door between a garage and dwelling in the past for a number of legitimate reasons not the least of which is the danger the closers pose to small children.

The effort to require closers on garage doors continued at the national level every year for perhaps fifteen years or more. Each year the membership denied the request because there was no statistical data to support the requirement and there had been no equivalent requirement in several of the legacy codes without an apparent problem.

During the last code cycle, this proposal was approved but again with erroneous and irrelevant arguments. There was no justification for the change and no evidence that a problem exists. Following is the justification from the fire service for the change published in the monograph during the last cycle.

> ***Reason:*** *There are times when proposed code submittals require a very lengthy substantiation, and then there are times when code change proposals just make sense. I would believe this is one of those times where a code change proposal makes a lot of sense. We are seeking a requirement to install items for very minimal costs yet great life saving potentials.*

If it "just makes sense", then there should be a justifiable reason for the requirement. If there is no reason, then it is overregulation. The presumption that the door between the house and garage will be left open is not rational. There is no evidence that the cost is minimal, that the benefit is real, or that any life saving would occur. Closers require maintenance and can easily be defeated by the homeowner. There is no standard specified in the code. It is obvious that there was no thought put into the proposal regarding the practicality, the need, or the ability to enforce. The closing force to engage the lock on a gasketed door can potentially be a hazard to young children who may get knocked over by the door or get fingers pinched in the closing side of the door or the latch side of the door upon closing. The vague language provides little guidance to install or approve these devices which can result in greater liability for the builder. Closers on these doors have not been required in many parts of the country for decades and there is no indication that it has created any hazard to life safety in those regions. This is a non-rated door in a non-rated frame in a non-rated wall.

Furthermore, there is no similar requirement for car ports. In fact, the code requires no protection of the wall between a dwelling and a carport. Windows are permitted. Hollow doors with glazing are permitted. Both structures house the same items including motor vehicles. A carport is enclosed on two or fewer sides. A garage is enclosed on more than two sides but one side can be completely open. And no vehicle door is required in either.

This amendment is necessary because it eliminates a potential for injury to small children, there is no data to support that there is a need for this rule, and it eliminates a source of potential liability for builders.

Cost Impact: None

R302.5.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal to create consistency as the language in this section has gone back and forth in various editions of the code. In accordance with the commentary to the IRC, the primary reason for this section is to limit the free flow of carbon monoxide and other products of combustion from entering the living area and that was not addressed at all by the proponent.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: There has never been justification for closers on the door between the garage and the dwelling. There is no statistical evidence to suggest that homes are any safer because of the closers. For every anecdote that a home was saved, there is another anecdote where the closer caused frequent and severe injuries to children or the door was closed by the occupant when they sensed a fire as they had been taught to do since 1st grade.

The IRC Committee disapproved the proposal with the statement that "the primary reason for the section is to limit the free flow of carbon monoxide and other products of combustion from entering the living area…" The reason for the separation between the dwelling and garage has never been a barrier for carbon monoxide entering the home much less a primary one. The title of the section in which this requirement is located is "**FIRE-RESISTANT CONSTRUCTION".** There are no requirements in this section of the code that the membrane on the garage wall nor the door be air tight and serve as a barrier to carbon monoxide.

The requirement for this separation in the legacy codes for decades was as a fire separation and existed long before carbon monoxide became an issue in homes. Furthermore, no one speaking in opposition to the proposal or on the committee offered any evidence to suggest that any health issues are occurring because of these doors being left open and a home being contaminated by carbon monoxide. In fact, it isn't happening.

And for CO to be a problem, two things would need to occur. First, an automobile would need to be left running and unattended for long enough to pollute the air to dangerous levels. Numerous studies now show that the amount of CO given off by modern automobile engines is insufficient to cause a health issue. Second, the door between the garage and the dwelling would need to be left open. The primary reason someone would leave a car running would be to warm the car in a cold climate. If the car is in a cold garage and needed warming, the occupants of the dwelling would not leave the door open and subject themselves to the influx of cold air. To think otherwise lacks logic.

You will likely hear arguments about not changing rules back and forth from year to year. Baloney! That is a really lousy reason to keep a poor code requirement in the code. We should only have reasonable and necessary requirements in the code and shouldn't have to struggle to come up with reasons why they are there.

This is an unnecessary requirement that creates more injuries than it does good. There is no evidence to suggest any benefit. That being said, it is the worst possible code requirement; one that only serves to increase the cost of construction.

Public Comment 2:

Andrew J Hyun, Fire Door Consultant, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between garage and residence shall be equipped with ~~solid wood doors not less than 1-3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1 3/8 inches (35 mm) thick, or~~ 20-minute fire-rated ~~doors~~ <u>door assemblies</u>, equipped with a self-closing device <u>and fire rated weather seal gasket</u>.

Commenter's Reason:

1. Decision of Committee, to disapprove Rick Davidson's proposal (RB90-13) to remove requirement of closing device, is very reasonable. Proponent, Rick Davidson, stated that "This (the door) is in a non-fire rated wall". However, Table R302.6 of IRC below indicates that (1) minimum ½" gypsum board is required for garage side wall as a separation to residence and (2) minimum ½" gypsum board is required for interior side of exterior walls which is located less than three feet from detached garage. Wall with ½ inch thick gypsum board is a fire rated wall as enclosed UL Directory Design No. U317 or No. U380. Therefore the intension of the IRC is to separate garage from residence with fire rated wall and fire rated opening.

Table R302.6 Dwelling/garage separation (Page 51 of IRC 2012)

Separation	Material
From the residence and attics	No less than ½ -inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	No less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	No less than ½ -inch gypsum board or equivalent
Garage located less than 3 feet from a dwelling unit on the same lot	No less than ½ -inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

2. Additionally "fire door assembly", instead of "fire door", shall be specified in the code. All fire door, door frame and hardware set shall be fire rated for proper protection of opening. The door set would fail to maintain intended fire resistance, when only door is fire rated but door frame is not fire rated components. Currently State of Wisconsin and State of New York require "fire rated door assembly" with fire label attached.
3. Also, the descriptive definition of the fire door in the current code is not fire rated doors. Thickness of most fire door is typically 1-3/4 inch as specified in the enclosed typical fire door listing (20-min steel door by Therma-Tru). Contractor would select least expensive doors as long as the subjected doors comply with code. Less expensive, non-fire rated, doors would be installed, and opening protection would not be established to the level of fire protection intended by IRC code. "20-minute rated fire door assembly" must be required in order to provide adequate fire protection intended.

   Note: Problem of descriptive fire doors in 302.5.1.
   "solid wood doors not less than 1-3/8 inches (35 mm) in thickness": 1-3/8 inch thick door is not sufficient for 20-min fire protection (fire penetration property). Most wood fire door is 1-3/4 inch in thickness. Stile and Rail doors would be considered as acceptable "solid wood doors" in current code description, however the joint between panel and stile/rail is recessed in thickness (such as only 1 inch thick) and may not sufficient to prevent fire penetration at joint area.
   "solid or honeycomb core steel doors not less than 1 3/8 inches (35 mm) thick": 1-3/8 inch in thickness is not sufficient to prevent excessive door warp and separation of door from frame. Most of 20-minute rated steel door is 1-3/4 inch thick to prevent excessive door warp. Even 1-3/4 inch thick steel doors made with thin steel skin (such as 25 gauge) is not fire rated door due to the excessive warp of the door under heat.

4. Finally fire rated weather seal gasket should be included in the fire door assembly to prevent smoke infiltration to the living area from the origin of fire (garage). It is well known that spreading of smoke, including carbon monoxide, is the main killer in case of fire.

RB90-13
Final Action: AS AM AMPC____ D

RB94-13
R302.12, R302.12.2 (New)

<u>Proposed Change as Submitted</u>

Proponent: Sean DeCrane, Battalion Chief, representing Cleveland Division of Fire, International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R302.12 Draftstopping. <u>Draftstopping shall be provided in construction in accordance with this section.</u>

<u>R302.12.1 Concealed spaces.</u> In combustible construction where there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m2). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

<u>R302.12.2. Attics.</u> <u>Draftstopping shall be provided in attics with an area that exceeds 1,500 square feet (92.9 m^2). The draftstopping shall be installed such that each draftstopped area of the attic does not exceed 1,500 square feet (92.9 m^2).</u>

Reason: Void spaces, are areas of potentially large fire growth that can have explosive results for responding and operating fire fighters. We have seen multiple incidents where large single-family residences can simulate commercial size fires due to the large open areas. Modern construction techniques are providing home owners with a number of options including large open spaces. These large floor plans lead to increased amounts of void spaces in the attic and floor systems. When fire travels into these attic spaces, they are fuel enriched by the combustible wood truss and in many instances the sprayed insulation.
With large amounts of oxygen the fire can grow unchecked and on many occasions showing very little evidence on the exterior of amount of fire present. One side discovery of the original Underwriters Laboratories studies on lightweight construction in 2006, was the performance of the plastic ridge vent which when subjected to elevated temperatures would melt and create a seal at the peak of the ridge causing the increased pressures from the fires to push downward on top of operating fire fighters.
We have seen instances where fire fighters have been killed or injured. In 2010 Fire Fighter Kyle Wilson, of Price William County, was killed while performing Search and Rescue operations from a wind driven exterior fire that accumulated in the attic space until it exploded downward trapping Fire Fighter Wilson in the Master Bedroom causing him to burn to death.
In 2012 in Huntington, MD, ten fire fighters were injured, two seriously, when they were investigating the smell of smoke on the second floor. The fire originated in the chimney and travelled into the attic space where it had plenty of air to grow uncontrolled until the building pressure caused the fire to explosively escape from the attic downward on the fire fighters. Fire fighters were forced to dive down the stairwell and out the second story windows causing one fire fighter to break his back.
The author will acknowledge the lack of technical justification at the time of submission. There is current testing being conducted at Underwriters Laboratories and NIST and we hope to have additional test data available at the code hearing in Dallas.

Cost Impact: This proposal will increase the cost of construction

R302.12-RB-DECRANE

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because the proponent acknowledged the current lack of justification for the 3,000 square feet criteria. The committee felt that the attic draftstopping would definitely be an issue. Furthermore, the test data referenced by the proponent has not been completed and, therefore, has not been available for review by the committee.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Sean DeCrane, representing Cleveland Division of Fire / International Association of Fire Fighters, requests Approval as Submitted.

Commenter's Reason: Tests are continuing at Underwriters Laboratories, with test results demonstrating a performance time of an exterior wall fire gaining access into the attic space from 2 minutes 30 seconds to over 8 minutes with a combustible wall covering. This is demonstrating the importance of confining these fires once they gain entry into the attic spaces. These attic spaces are not protected with sprinkler systems and have a large volume of available air to sustain burning. If we can limit the available air pocket and provide some compartmentation we can reduce the larger fire growth in the attic space and reduce the danger to the occupants and responding fire fighters.

Public Comment 2:

Steve Orlowski and Tim Ryan, representing National Association Of Home Builders (NAHB) and International Association of Building Officials (IABO), requests Disapproval.

Commenter's Reason: We agree with the committee's action to disapprove the proposed code change based on the lack of technical justification to require draftstopping every 1,500 square feet in attic spaces. While the proponent has given examples of events that have led to the creation of the proposed code change, without some credible research which shows that dividing the attic space into 1,500 square foot compartments will prevent similar events from occurring this is premature. Until UL completes its study of the dynamics of fire growth in attics and the influence it will have on fire mitigation tactics and prevention, we urge the assembly to support the committee's action of disapproval.

RB94-13
Final Action: AS AM AMPC____ D

RB96-13, Part I

R302.13 (New)

<u>Proposed Change as Submitted</u>

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC COMMITTEE. PART II WILL BE HEARD BY THE IECC COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Duncan Prahl, IBACOS Inc, representing self (dprahl@ibacos.com)

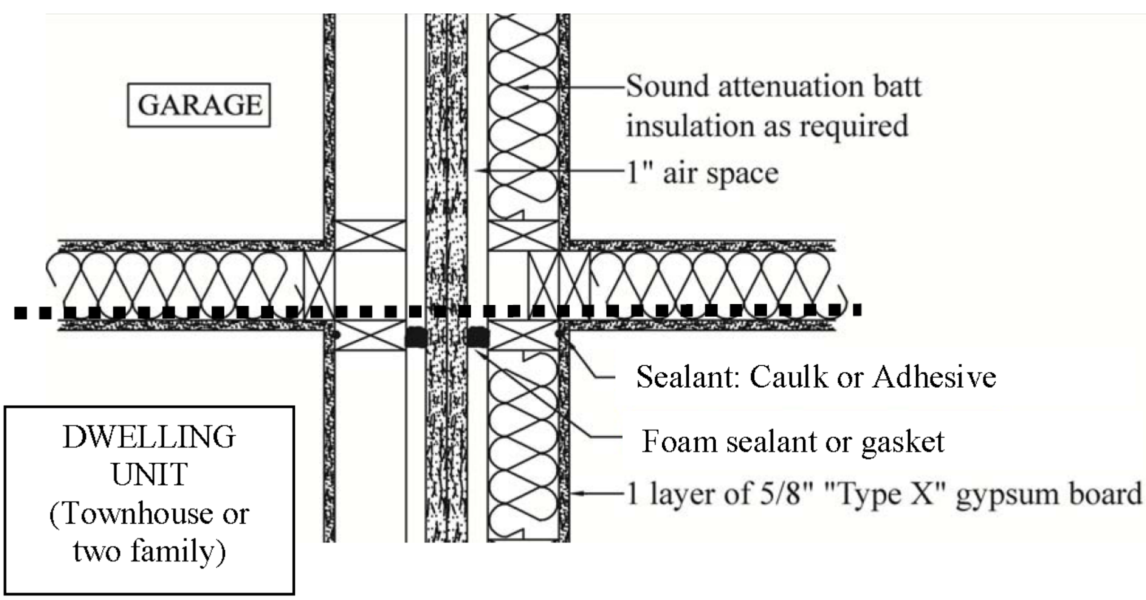
PART I - IRC-RB

Add new Text as follows:

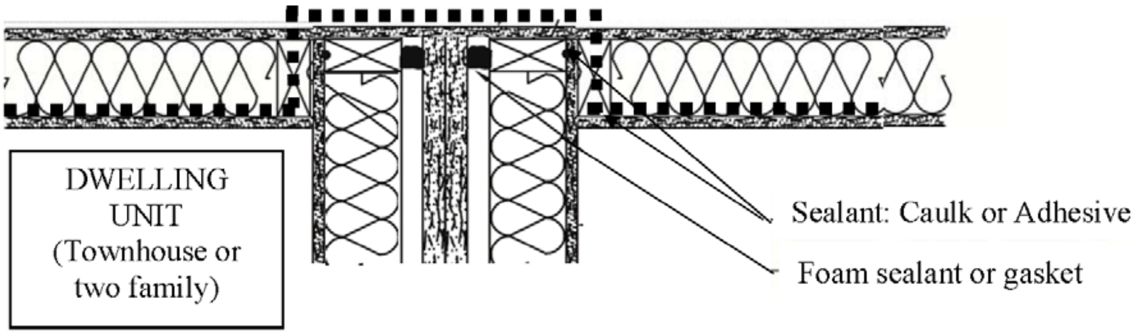
<u>**R302.13 Sealants.** In combustible construction, sealants that are used to limit air leakage in accordance with Section N1102.4 and Table N1102.4.1.1 shall not be required to comply with ASTM E 136 and shall not be required to be included in the fire tests required in association with the following:</u>
<u>1. Fire resistant assemblies where required by Sections R302.1, R302.2, R302.4, and R302.6;</u>
<u>2. Fireblocking where required by Section R302.11 and</u>
<u>3. Draftstopping where required by Section R302.12.</u>
(Existing Section R302.13 to be renumbered.)

Reason: Many ASTM E119 tested assemblies do not include any sealant materials for airtightness at the location where the assembly intersects the thermal enclosure of the building in the real world. Builders and code officials should be guided specifically on the airsealing that should be included at these locations. The materials used for sealing this location fall under the same criteria as sealants that the committee approved in for sealants used to fireblock annular spaces per R302.11. Many common sealants have an auto ignition temperature that is the same as or higher than the wood framing within the assembly and, as such, would only burn if the wood in the assembly was already on fire.

Examples of locations that are indicative of the need for sealants within fire separation assemblies follow. The heavy dotted line indicated the desired location of the airtightness layer within the constructed assembly as it appears in some typical details:



Two hour separation, plan view at garage



Two hour separation, plan view at exterior wall

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

R302.13 (NEW)-RB-PRAHL

Committee Action Hearing Results

PART I – IRC Building
Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that, if something is part of a fire assembly, it must meet the criteria for that assembly. If you change the assembly, the rating is no longer valid. Section R302.11 in the proposal basically says that compliance with the proposal should not reduce the fire rating, but no justification has been provided to support that. If a building burns down due to fire safety issues, it takes a lot of energy to rebuild. The balance between fire safety and energy concerns are not level. The concept of this proposal may be good, but many details need to be addressed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Duncan Prahl, IBACOS, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R302.13 Sealants~~.~~ ~~In combustible construction,~~ Sealants that are used to limit air leakage in accordance with Section N1102.4 and Table N1102.4.1.1 shall meet the *approved material* requirements of Section R302.11. 4. ~~not be required to comply with ASTM E 136 and shall not be required to be included in the fire tests required in association with the following:~~

~~1. Fire resistant assemblies where required by Sections R302.1, R302.2, R302.4, and R302.6;~~
~~2. Fireblocking where required by Section R302.11 and~~
~~3. Draftstopping where required by Section R302.12.~~

(Existing Section R302.13 to be renumbered.)

Commenter's Reason: ASTM E119-00a, section 4.4.4 states that the test method is not applicable to the "Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections."

The committee was concerned that the proposal would add something to the fire assembly. As the location is not actually part of the assembly, but at the joint between assemblies, this concern should now be addressed. Language has been modified to reflect that the sealant is to be used only at the joint, and not inside the assembly.

The intent of this proposal is to clarify that the location between interior fire assemblies and the building thermal envelope fire assemblies are to be considered a "joint. Since the IRC is silent on the subject of joints as they relate to fire separation assemblies, this language clarifies what is an acceptable material is to meet the requirements of Section N1102.4. As ASTM E119 is not intended to describe the fire behavior of joints, materials that are acceptable in other sections of the code should be considered to be acceptable in this “joint”.

RB96-13, Part I
Final Action: AS AM AMPC____ D

RB96-13, Part II
Table N1102.4.1.1 (R402.4.1.1)

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC COMMITTEE. PART II WILL BE HEARD BY THE IECC COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Duncan Prahl, IBACOS Inc, representing self (dprahl@ibacos.com)

PART II - IECC-RE

Revise as follows:

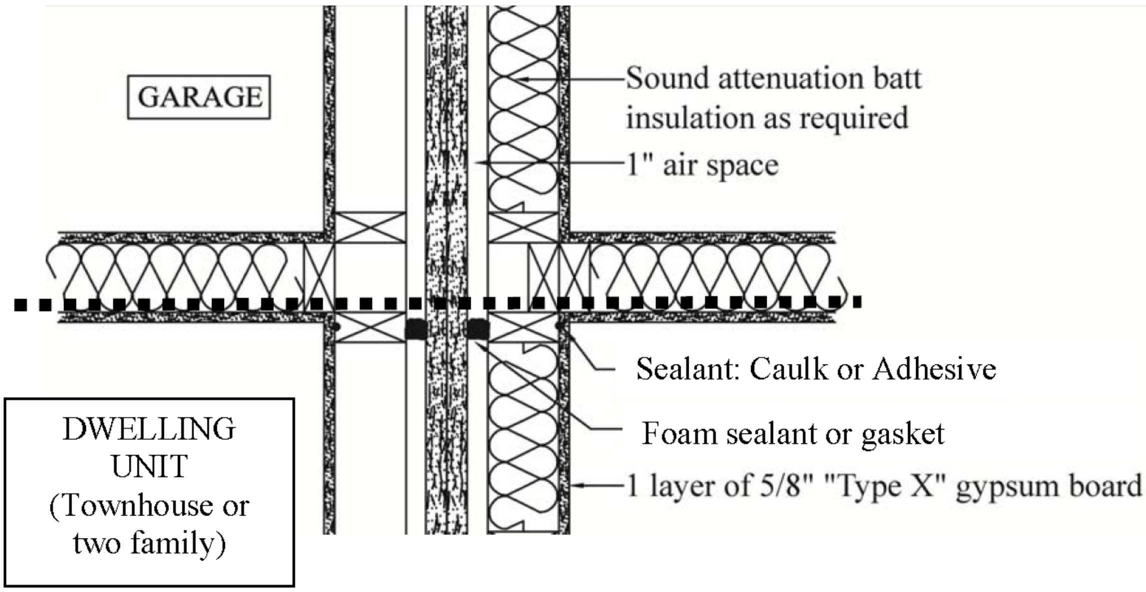
TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

Fire separation assemblies in accordance with *International Residential Code* Sections R302.1, R302.2, R302.4, and R302.6, and fireblocking and draftstopping in accordance with *International Residential Code* Sections R302.11 and R302.12, respectively.	Air sealing shall be provided in all fire separation assemblies where the assembly, fireblocking or draftstopping is part of or intersects the thermal enclosure.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces

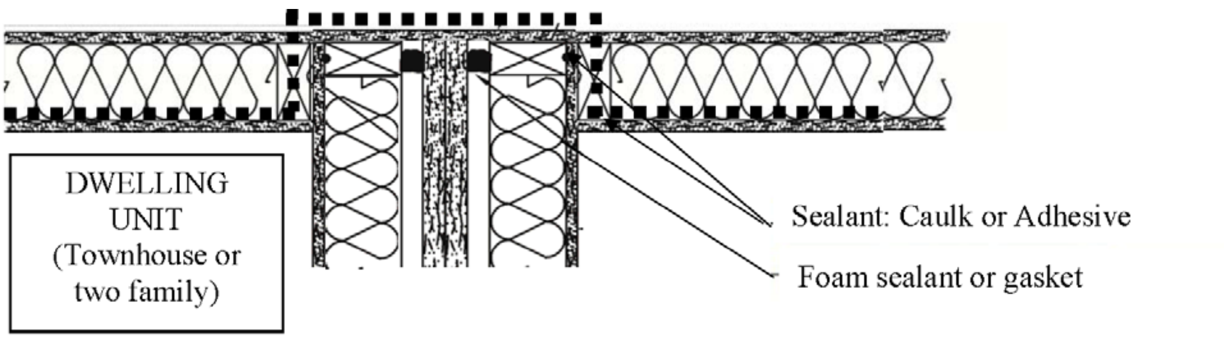
(Portions of table not shown to remain unchanged)

Reason: Many ASTM E119 tested assemblies do not include any sealant materials for airtightness at the location where the assembly intersects the thermal enclosure of the building in the real world. Builders and code officials should be guided specifically on the airsealing that should be included at these locations. The materials used for sealing this location fall under the same criteria as sealants that the committee approved in for sealants used to fireblock annular spaces per R302.11. Many common sealants have an auto ignition temperature that is the same as or higher than the wood framing within the assembly and, as such, would only burn if the wood in the assembly was already on fire.

Examples of locations that are indicative of the need for sealants within fire separation assemblies follow. The heavy dotted line indicated the desired location of the airtightness layer within the constructed assembly as it appears in some typical details:



Two hour separation, plan view at garage



Two hour separation, plan view at exterior wall

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

R302.13 (NEW)-RB-PRAHL

Committee Action Hearing Results

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This area related to thermal envelope installation could easily be overlooked. Therefore the installation table is a good place to mention this.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Duncan Prahl, IBACOS, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

Joints between fire separation assemblies in accordance with International Residential Code Sections R302.1, R302.2, R302.4, and R302.6, and fireblocking and draftstopping in accordance with International Residential Code Sections R302.11 and R302.12, respectively.	Air sealing shall be provided ~~in all~~ at the joint between fire separation assemblies that are part of the *building thermal envelope* and fire separation assemblies required by Section R302.2 ~~where the assembly, fireblocking or draftstopping is part of or intersects the thermal enclosure.~~
Garage separation	Air sealing shall be provided between the garage and conditioned spaces

Commenter's Reason: ASTM E119-00a, section 4.4.4 states that the test method is not applicable to the "Simulation of the fire behavior of joints between building elements such as floor-wall or wall-wall, etc., connections."

The committee was concerned that the proposal would add something to the fire assembly. As the location is not actually part of the assembly, but at the joint between assemblies, this concern should now be addressed. Language has been modified to reflect that the sealant is to be used only at the joint, and not inside the assembly.

The intent of this proposal is to clarify that the location between interior fire assemblies and the building thermal envelope fire assemblies are to be considered a "joint. Since the IRC is silent on the subject of joints as they relate to fire separation assemblies, this language clarifies what is an acceptable material is to meet the requirements of Section N1102.4. As ASTM E119 is not intended to describe the fire behavior of joints, materials that are acceptable in other sections of the code should be considered to be acceptable in this "joint".

RB96-13, Part II

Final Action: AS AM AMPC____ D

RB97-13, Part I
R303.1

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-RB COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Joe Lstiburek, Building Science Corporation; Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com); Thomas D. Culp, Birch Point Consulting, representing the Glazing Industry Code Committee

PART I-IRC-RB

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

~~1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.~~

~~2~~1. The glazed areas need not be installed in habitable rooms without exterior walls, where an opening is not required by Section R310, mechanical ventilation is installed in accordance with Section M1507, and ~~Exception 1 above is satisfied and~~ artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

~~3~~2. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

Reason: Experience from decades of work with builders confirms that achieving a home air tightness of around 3 to 5 ACH 50 is not difficult if the builder just addresses the "big holes" during construction.[1] The practice of addressing big holes was initially tackled by builders to reduce call backs associated with comfort complaints from homebuyers. Once builders figured out that plugging the big holes reduced callbacks, the practice went mainstream. In 2009, the steps required to plug the big holes were codified in the mandatory air barrier table (IRC Table N1102.4.2; IECC Table R402.4.1.1). At the end of 2012, 55% of the states had adopted the 2009 IECC or more stringent. Fast forward to 2015, and 76% of states (which accounted for 86% of the single family starts in 2011) are expected to have adopted the 2009 IECC or more stringent.[2]

This timeline shows that building tight (3 to 5 ACH 50) has become the new standard, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it can have on indoor air quality if mechanical ventilation is not provided; and there is broad consensus that air quality begins to be compromised at or below 5 ACH 50 if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

With today's typical, code-minimum construction resulting in homes that easily achieve 3 to 5 ACH 50, a blower door test is not needed to confirm that these homes are less than 5 ACH 50 and in need of mechanical ventilation. At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders are now building are also provided with minimum indoor air quality.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
2. U.S. DOE Building Energy Codes Program, "Status of State Energy Code Adoption, Residential: Projected" accessed from http://www.energycodes.gov/adoption/states on Nov 29, 2012.

Cost Impact: Because new standard construction practices will typically result in building envelope tightness levels of 3 to 5 ACH 50, these dwellings should already be provided with mechanical ventilation (based on R303.4). So, no additional costs should be incurred for mechanical ventilation systems. Also, removing the loophole of trading off windows for mechanical ventilation in habitable rooms is not expected to affect the practice of the overwhelming majority of builders who tend towards more windows, versus less, based on consumer demand.

R303.1-RB-CULP-LSTIBUREK-MOORE

Committee Action Hearing Results

PART I – IRC Building
Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt the proposal does not work well without Part II, which was disapproved. The proponent points to another code section in their reason statement, but that section basically requires you to take a guess at what the air rates are, or requires a blower door test, before you can decide whether you need mechanical ventilation or not. That is after the fact and does not seem to be the proper order. Finally, there is no reason that a media room must be on an exterior wall.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Submitted.

Commenter's Reason: The specification of mechanical ventilation should not be used to over-write requirements for operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

RB97-13, Part I
Final Action: AS AM AMPC____ D

RB97-13, Part II
R303.4, M1507.1

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-RB COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Joe Lstiburek, Building Science Corporation; Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com); Thomas D. Culp, Birch Point Consulting, representing the Glazing Industry Code Committee

PART II-IRC-RM

Revise as follows:

R303.4 Mechanical ventilation. ~~Where the air infiltration rate of a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the d~~Dwelling unit<u>s</u> shall be provided with <u>local exhaust and</u> whole-house mechanical ventilation in accordance with Section M1507~~.3~~.

M1507.1 General. ~~Where l~~<u>L</u>ocal exhaust ~~or~~ <u>and</u> whole-house mechanical ventilation ~~is provided, the equipment~~ <u>systems</u> shall be designed <u>and installed</u> in accordance with this section.

Reason: Experience from decades of work with builders confirms that achieving a home air tightness of around 3 to 5 ACH 50 is not difficult if the builder just addresses the "big holes" during construction.[1] The practice of addressing big holes was initially tackled by builders to reduce call backs associated with comfort complaints from homebuyers. Once builders figured out that plugging the big holes reduced callbacks, the practice went mainstream. In 2009, the steps required to plug the big holes were codified in the mandatory air barrier table (IRC Table N1102.4.2; IECC Table R402.4.1.1). At the end of 2012, 55% of the states had adopted the 2009 IECC or more stringent. Fast forward to 2015, and 76% of states (which accounted for 86% of the single family starts in 2011) are expected to have adopted the 2009 IECC or more stringent.[2]

This timeline shows that building tight (3 to 5 ACH 50) has become the new standard, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it can have on indoor air quality if mechanical ventilation is not provided; and there is broad consensus that air quality begins to be compromised at or below 5 ACH 50 if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

With today's typical, code-minimum construction resulting in homes that easily achieve 3 to 5 ACH 50, a blower door test is not needed to confirm that these homes are less than 5 ACH 50 and in need of mechanical ventilation. At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders are now building are also provided with minimum indoor air quality.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
2. U.S. DOE Building Energy Codes Program, "Status of State Energy Code Adoption, Residential: Projected" accessed from http://www.energycodes.gov/adoption/states on Nov 29, 2012.

Cost Impact: Because new standard construction practices will typically result in building envelope tightness levels of 3 to 5 ACH 50, these dwellings should already be provided with mechanical ventilation (based on R303.4). So, no additional costs should be incurred for mechanical ventilation systems. Also, removing the loophole of trading off windows for mechanical ventilation in habitable rooms is not expected to affect the practice of the overwhelming majority of builders who tend towards more windows, versus less, based on consumer demand.

R303.1-RB-CULP-LSTIBUREK-MOORE

Committee Action Hearing Results

PART II – IRC – Mechanical
Committee Action: Disapproved

Committee Reason: Builders need a choice. The proposal will require mechanical ventilation whether or not it is needed. Section N1102.4.1.2 states how to provide outdoor air ventilation and this proposal deletes the reference to that section.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R303.4 Mechanical ventilation. Dwelling units shall be provided with ~~local exhaust and whole-house~~ mechanical ventilation in accordance with Section M1507.

M1507.1 General. ~~Local exhaust and whole-house m~~Mechanical ventilation systems shall be designed and installed in accordance with this section.

Commenter's Reason: In Dallas, the committee disapproved this proposal because they said that "Builders need a choice. The proposal will require mechanical ventilation whether or not it is needed." However, the problem with the current language is that 75% of new residential starts are currently being built to the 2009 or 2012 IECC, and that *all* of these homes are subject to the mandatory air sealing requirements of Table R402.4.1.1. Multiple, independent studies have shown that a large percentage of these homes are being built tighter than 5 ACH 50, meaning that mechanical ventilation IS needed according to the 2012 IRC (R303.4).[3,4]

The problem is that despite being needed, mechanical ventilation is not required for these homes by the IRC because the requirement is based on an optional test. We already know that new residential starts across the nation are being built to very tight standards based on widespread adoption of the 2009 IECC, regardless of whether they're being tested. The way the code is currently written, it doesn't matter how tight the home is, because as long as the home isn't tested, no mechanical ventilation is required.

The IRC needs to respond to this current problem of building tight homes with inadequate ventilation. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts. Does anyone remember the sick building syndrome of the 1970s?[6]

The solution is to require mechanical ventilation for all new homes, understanding that new homes are tight homes. End the "don't ask; don't tell" policy for mechanical ventilation of tight homes, and provide home owners with the opportunity to have a safer and healthier environment.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
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RB97-13, Part II

Final Action: AS AM AMPC____ D

RB99-13
R303.1

Proposed Change as Submitted

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

~~1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.~~

~~2~~1. The glazed areas need not be installed in rooms ~~where Exception 1 above is satisfied and~~ without *exterior walls* where all of the following conditions are met:
   1.1 An opening is not required by Section R310.
   1.2 A~~a~~rtificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
   1.3 A whole-house mechanical *ventilation* system is installed in accordance with Section M1507.

~~3~~2. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

Reason: While whole-house mechanical ventilation systems can provide adequate ventilation when in operation, natural ventilation should still be provided as an option and more importantly, needs to be provided as a back-up in the event of power outages, especially when power outages can be prolonged for many hours or many days, or for problems that may occur with the ventilation system, or for in-home events such as cooking or burning food when supplemental natural ventilation may be needed or desired. Therefore, a blanket exception should not be provided.

The amendment to Exception 2 is proposed to maintain an exception for providing glazed areas in rooms (such as certain basement rooms) with no *exterior walls* as defined by the IRC provided they meet all of the same conditions required by the current provisions in order for the exception to R303.1 to apply.

Cost Impact: This code change may increase the cost of construction in some cases where fixed glazing may have been used in lieu of openable glazing and then depending on the glazing options being considered.

R303.1 #4-RB-INKS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proponent's reason statement promotes retaining natural ventilation as an option or as a supplement to whole house ventilation. However, this proposal would make the whole house ventilation redundant except in a room without exterior walls. Only anecdotal evidence is provided to support such a change in philosophy. If the mechanical component of another proposed change that required mechanical ventilation had passed, the committee may have been able to support this proposal. The general logic is good, but it is too architecturally restrictive as proposed. Under the performance path in the energy code, given proposals passed at these hearings previously, you can go above 3 or 5 ACH50 using trade-offs under the performance path.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeff Inks, representing Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: We are requesting approval as submitted for the reasons stated in our proposal above, which we do not believe are anecdotal. In addition and in response to the committee's other reasons for disapproval: (1) This proposal does not retain or create an option for using natural ventilation in lieu of whole house mechanical ventilation where it may be or is required. The intent of the proposal is to ensure natural ventilation is provided as an option in most habitable rooms even when whole house mechanical ventilation is provided. (2) Ensuring natural ventilation is also provided as a supplement to whole house ventilation is precisely the intent of the proposal which better provides for ensuring occupant comfort, health and safety. (3) We do not believe limiting the exception makes whole house ventilation redundant for the reasons just stated. Both serve important purposes. (4) We respect the concern/opinion that limiting the exception to where glazed areas and natural ventilation do not have to be provided may be too architecturally restrictive however, we believe the exception should be more limited than it currently is, again for the reasons stated. (5) Even if 3 or 5 ACH (respectively) are exceeded, that does not alleviate the need for the providing adequate natural ventilation.

For these reasons in addition to the reasons provided in the proposal, we urge approval as submitted.

Public Comment 2:

Dr. Thomas D. Culp, Birch Point Consulting LLC, representing Glazing Industry Code Committee, requests Approval as Submitted.

Commenter's Reason: We were a co-proponent of RB97, but are instead asking for you to approve RB99 As Submitted as a simpler solution to the issue. The debate on RB97 Part 2 whether or not to require mechanical ventilation seemed to confuse the issue in RB97 Part 1 and this proposal RB99. Contrary to some of the discussion at the preliminary code hearings, this proposal does <u>not</u> require mechanical ventilation. It is simply modifying the exceptions so that <u>*if*</u> mechanical ventilation is installed (especially with tighter homes being required in the energy code), then operable windows should still be installed in accordance with the charging section. This is accomplished by deleting exception 1, and modifying exception 2 so that windows obviously don't need to be installed in interior rooms with no exterior walls.

We believe that much of the discussion of this proposal was confused with issues in other proposals. For example, the committee statement that this proposal is "too architecturally restrictive" simply does not make sense. This proposal does not cause a design change of the home layout – it simply requires that a portion of the windows that *already* must be installed to satisfy section R303.1 be operable windows, and not switched out for all fixed windows.

Mechanical ventilation is not foolproof, and the code should not discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control his or her own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout).

We ask that you vote "NO" on the initial motion for disapproval, and then to vote "YES" on a motion to approve RB99 as-submitted.

Public Comment 3:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: The 2012 IECC and 2012 IRC require that the air leakage of the building thermal envelope of homes be less than 3 Air Changes per Hour (ACH) when tested at 50 Pa. The 2012 IRC requires a whole house mechanical ventilation system in homes with less than 5 ACH at the same pressure differential.

The 2012 IRC, and earlier editions of the IRC, require windows for natural light and ventilation in the home. An exception is given when artificial light and whole house ventilation are provided.

The tighter air leakage requirements of the 2012 IRC and 2012 IECC would require whole house mechanical ventilation. This would then put into place the exception to the natural ventilation requirement of the IRC. Therefore, if a jurisdiction is enforcing the 2012 IECC without amendment the building must install a whole house mechanical ventilation system and no natural ventilation would be required.

Such a scenario could create significant health and life safety hazards in the home. Relying entirely upon a mechanical ventilation system to provide sufficient oxygen for the occupants to breath, sufficient combustion air for all fuel fired appliances to burn properly, sufficient air movement to prevent the growth of mold, sufficient air changes to remove harmful bacteria and viruses that may have been brought into the home, etc. could significantly impact human life even if the mechanical system operated as intended. If the mechanical system were to fail the results could be catastrophic.

It is important that sufficient means of natural ventilation be maintained in homes, particularly when considered with the increased requirements for air tightness of the building thermal envelope in the 2012 IECC and 2012 IRC.

RB99 keeps an exception to the requirement for natural ventilation when mechanical ventilation is required, but now limits it to specific spaces where it is not practical to provide natural ventilation. Specifically, the exception is limited to interior rooms that do not have exterior walls, are not required to have emergency escape and rescue openings, and which are provided with sufficient artificial lighting.

Limiting reliance upon a mechanical system in the home to provide adequate fresh air to these specific spaces maintains the life safety of the IRC. Since reliance upon natural ventilation in low rise residential construction is consistent with current practice RB99 would not contribute to the cost of a new home significantly.

RB99-13

Final Action: AS AM AMPC____ D

RB100-13
R303.4

Proposed Change as Submitted

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com), Jeremiah Williams representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise as follows:

R303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is ~~less than~~ 5 air changes per hour <u>or less</u> when tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

Reason (Moore): The current language is inconsistent with N1103.5, which requires mechanical ventilation for all dwellings, and also requires dwellings in climate zone 1 and 2 to have an air tightness "not exceeding" 5 ACH 50. By changing this language to 5 ACH or less, "the two sections are brought closer into alignment.

Reason (Williams) : Chapter R4 of the International Energy Conservation Code and Chapter 11 of the IRC require air leakage to be equal or less than 5 air changes per hour in climate zones 1 and 2, with lower rates required in other climate zones. This minor code change creates consistency where all buildings constructed to the air tightness levels of the IECC and IRC must have whole house mechanical ventilation systems.

Cost Impact (Moore): There is no additional cost, as mechanical ventilation is already required for these dwellings based on section N1103.5.

Cost Impact (Williams): The code change proposal will increase the cost of construction only if tested air leakage in climate zones 1 and 2 is exactly 5 air changes per hour.

R303.4-RB-MOORE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal increases the cost of construction and takes away the ability to avoid having a whole- house ventilation system.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Mike Moore, P.E., Newport Ventures, representing Broan-NuTone, requests Approval as Submitted.

Commenter's Reason: In Dallas, the committee disapproved this proposal because they said it, "increases the cost of construction and takes away the ability to avoid a whole-house ventilation system." This statement shows a misunderstanding on the committee's part regarding the intent of this section and the limitations of blower door testing.

First, the intent of this section is to require that buildings that are built to the strict air tightness requirements of the IECC are provided with whole-house mechanical ventilation. The current language does not reflect the original intent because it introduces a loop hole for buildings that test to exactly 5.0 ACH 50. The difference in natural air changes between a building that has an air tightness of 5.0 ACH 50 and 4.9 ACH 50 is ridiculously small when taken over the course of the year, and there is no basis to say that a home at 5 ACH 50 should not need ventilation, whereas the 4.9 ACH 50 home does. In other words, we have a loop hole in the code with no technical basis whatsoever.

Another problem with this loop hole (besides the fact that there is no technical basis to justify it) is that specifications of mechanical ventilation systems happen far in advance of when the air tightness test is performed. It's a ridiculous proposition for a builder to plan to achieve exactly 5.0 ACH 50 on homes. The only way for a builder to plan for and consistently achieve a 5 ACH 50 on each home he builds is either to falsify the results or to build tighter than 5 ACH 50 and then punch holes in the envelope until the building leaks at just the right rate. By keeping the language the way that this is, you're incentivizing builders to follow one of these two paths.

Please approve this proposal as submitted to close the loop hole, provide consistency between the IRC and IECC, and stop incentivizing bad building practices.

Public Comment 2:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: Chapter R4 of the International Energy Conservation Code and Chapter 11 of the IRC require air leakage to be 5 air changes per hour or less in climate zones 1 and 2, with lower rates required in other climate zones. This minor code change creates consistency by imposing the same whole-house mechanical ventilation requirements on all buildings constructed to the air tightness levels of the IECC and IRC.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

RB100-13

Final Action: AS AM AMPC____ D

RB101-13
R303.5.1

Proposed Change as Submitted

Proponent: David Hall, CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise text as follows:

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks~~, except as otherwise specified in this code~~. ~~Where a source of contaminant is located within 10 feet (3048 mm) of an intake opening, such opening shall be located a minimum of 3 feet (914 mm) below the contaminant source~~.

For the purpose of this section, the exhaust from *dwelling* unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

Exceptions:

1. The 10 foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. Separation distances for appliance vents shall be as allowed in Chapters 18 and 24.

Reason: This proposal is text cleanup**.** The phrase "except as otherwise specified in this code" is not user-friendly since it offers no guidance as to where something else is specified. The new exception # 2 provides the exact text for what is otherwise specified. New exception # 1 is just the original last sentence of this section reworded into an exception format, because it is actually an exception to the 10 foot rule.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

R303.5.1-RB-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Paul Rimel, City of Staunton, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify proposal as follows:

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks.

For the purpose of this section, the exhaust from *dwelling* unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

Exceptions:

1. The 10 foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. ~~Separation distances for appliance vents shall be as allowed in Chapters 18 and 24.~~ Vents and chimneys swerving fuel-burning appliances shall be terminated in accordance with the applicable provisions of Chapter 18 and 24.
3. Clothes dryer exhaust ducts shall be terminated in accordance with M1502.3.

Commenter's Reason: RB101-13 does not reference the clothes dryer termination requirements found in M1502.3 and neither does the next section R303.5.2 (Exhaust openings). The 2nd sentence of the reason statement says "The new exception #2 provides the exact text for what is otherwise specified", however, no exception has been included that references the dryer exhaust separation distances found in Chapter 15. Deleting the current language "except as otherwise specified in the code" will only serve to further reduce the likelihood that users of the code will know to look elsewhere for the dryer termination requirements unless #3 is added to the list of exceptions.

The current wording of this proposal will cause many users of the code to think a dryer exhaust is required to meet the more restrictive provisions of R303.5.1 when it's actually M1502.3 that regulates the minimum distance a dryer exhaust duct is permitted to terminate from building openings. Per M1502.3, a dryer exhaust is only required to terminate 3 feet in any direction from building openings unless stated otherwise in the manufacturer's installation instruction. However, the use of R303.5.1 would require a 10 foot horizontal or 3 foot vertical separation for a type of non-hazardous/noxious exhaust that's already defined in the IMC as environmental air.

In the majority of cases, it would be very difficult to terminate a clothes dryer exhaust at least 10 feet horizontally or 3 feet vertically from all building openings in conventional residential construction and the common practice of terminating through a ground floor band board would be virtually eliminated in houses with crawlspaces due to the proximity of nearby crawlspace vents.

Exception #2 has been modified for clarity.

RB101-13

Final Action: AS AM AMPC____ D

RB102-13
R303.7, R303.7 (New), R303.7.1, R303.8 (New)

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

~~**R303.7 Stairway illumination.** All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 footcandle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a *basement* from the outside *grade* level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.~~

> ~~**Exception:** An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.~~

~~**R303.7.1 Light activation.** Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers. The illumination of exterior stairways shall be controlled from inside the *dwelling* unit.~~

> ~~**Exception:** Lights that are continuously illuminated or automatically controlled.~~

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot-candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

> **Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.

R303.8 Exterior door illumination. At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each exterior door having grade level access, including exterior stairways providing access to a basement.

> **Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.

(Renumber subsequent sections)

Reason: This section is proposed for revision for one reason – it is confusing. The first sentence says that all interior and exterior stairways, including treads and landings, shall be illuminated. The next two sentences state that interior stairs must have lights near the landings and provide a minimum of 1 foot-candle of light. Then the next sentence states that exterior stairs must be provided with a light source in the immediate vicinity of the top landing but seems to exclude treads and landings. So, going back to the first sentence, the code says exterior stairs need landings and tread illuminated. Now just the top landing is illuminated for exterior stairs. Which one is it? The reference to 1 foot-candle of light is only applicable to interior stairs. It seems there is no standard for exterior stairs. But some code officials apply the 1 foot-candle standard to exterior stairs and others do not. Some code officials require exterior stairs to be illuminated along their entire length. Others only require light at the top landing. Then there is the exception that appears to apply only to interior stairs but can be misconstrued to support the contention that exterior stairs must be lit for their entire length.

Furthermore, the code requires the light source be in specific locations and meet certain intensities. If the intensity is met, what difference does it make where the light source is? The text referencing the location of the light source for interior stairs is proposed for deletion since the interest is in the amount of light on the walking surface, not on the light location.

The electrical code will require a switched light at exterior doors but that may not illuminate exterior stairs. This proposal would not waive any requirement found in the electrical code but there seems to be a conflict between what could be argued is the intent of R303.7, which is to illuminate exterior stairs, and the electrical code which only requires illumination of the exterior side of exterior doors having access to grade.

> ***E3903.3 Additional locations.*** *At least one wall-switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, and detached garages with electric power.* ***At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each outdoor egress door having grade level access****, including outdoor egress doors for attached garages and detached garages with electric power. A vehicle door in a garage shall not be considered as an outdoor egress door. Where one or more lighting outlets are installed for interior stairways, there shall be a wall switch at each floor level and landing level that includes an entryway to control the lighting outlets where the stairway between floor levels has six or more risers.*
>
> > ***Exception:*** *In hallways, stairways, and at outdoor egress doors, remote, central, or automatic control of lighting shall be permitted.*

The proposed revisions create separate sections for interior stairways and exterior doorways. It eliminates a term that is difficult to enforce - "immediate vicinity". It uses the same text found in the electrical code to identify the light location at exterior doors and the exception addressing controls. Some text is editorially revised to eliminate repetitive language but the basic intent is left unchanged. The light levels and exceptions are retained as they are in the current rule. It is believed that this change helps to eliminate some confusion and improve uniformity of application and creates consistency between the building and electrical portions of the IRC.

Cost Impact: None

R303.7-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it should include language that requires that the light must shine on the stair.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot-candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

> **Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.

R303.8 Exterior ~~door~~ stairway illumination. ~~At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each exterior door having grade level access, including exterior stairways providing access to a basement~~. Exterior stairways shall be provided with an artificial light source located at the top landing of the stairway. Exterior stairways providing access to a *basement* from the outside *grade* level shall be provided with an artificial light source located at the bottom landing of the stairway.

> ~~**Exception:** A switch is not required where remote, central, or automatic control of lighting is provided.~~

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: This proposal was presented as an ***editorial*** revision to the stair illumination requirements which is necessary to reduce the confusion that is occurring with application of the rule and to prevent a jurisdiction from finding themselves deep in the prosecution of a violation only to determine that no code requirement exists.

In the current code there is one paragraph that regulates both interior and exterior stairways. The proposal seeks to split the paragraph in two with one paragraph regulating interior and one paragraph regulating exterior stairs. There is no intent to change the meaning of the code or expand the requirements. It is believed that the current language confuses the application of stair illumination because of the structure of the paragraph which can lead the reader to believe that there are more to the rules for exterior stair illumination than exists.

Reading the existing text, the first sentence of the paragraph states that interior and exterior stairs must be illuminated. This is the sentence that causes the confusion because it states that exterior stairs must be illuminated. But this directive is clarified in the fourth sentence addressed below.

The second and third sentences provide direction on how ***interior*** stairs must be illuminated. It provides both a prescriptive standard for the location of the light source and a performance standard in the form of a minimum level of illumination. Because meeting the prescriptive standard does not mean meeting the performance standard and vice versa, only a performance standard of 1 foot-candle on each tread and at landings is proposed as the most reasonable and least hazardous.

The fourth (and troublesome) sentence provides direction on how ***exterior*** stairs must be illuminated. Current code language ***only provides that a light source be placed at the top landing of the stairway***. It provides ***no direction on illumination of the stair itself***.

This is supported by the IRC Commentary which follows and which states that "Exterior stairs require illumination only at the top landing".

As was stated at the Dallas hearings, this proposal is not intended to provide illumination on exterior stairs because that is not currently required. That would be another code change. This modification amends the original submittal to include the language in the current code regarding exterior stairs. It does delete references to "immediate vicinity" because the term is undefined and the electrical code provides direction on the location and operation of this light source.

You can argue all you wish that this proposal does not provide for illumination of exterior stairs and you would be right. But you can't get to illuminated exterior stairs with the current rules either.

If you want a light source on the treads of exterior stairs, the current language does not provide that and this proposal does not provide that. Another code change would need to be submitted that directs how exterior stairs should be illuminated and how the illumination would be controlled.

If you should disagree with this line of reasoning, the question that begs asking is "what is the standard of lighting that applies to exterior stairs?" If you believe that exterior stairs must be illuminated and you write a correction notice to that effect, what standard does a compliant lighting system need achieve? If you prosecute this as a violation and you are asked by a judge what standard is necessary to achieve compliance, what code section do you cite? It isn't enough that we just write correction orders for how we thing a building should be built, we need to be able to cite code sections that will withstand challenges on prosecution.

Let's get the language improved so that it is uniformly and rightly applied. If you wish to change expand the rule in the next cycle, please do.

Don't throw the baby out with the bathwater because exterior stair illumination is not provided here. The change is necessary to eliminate the confusion that was readily apparent at the Dallas hearings.

R303.6 Stairway illumination. All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 foot-candle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.

> **Exception:** An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.

❖ Interior and exterior stairs may be illuminated in two ways. The first option is to install artificial lighting in the vicinity of each landing. This would include top, intermediate and bottom landings. For interior stairs, the artificial light must be capable of illuminating treads and landings to not less than 1 foot candle (11 lux). The measurement of 1 foot candle is to be taken at the center of landings and treads. Exterior stairs require illumination only at the top landing. See Commentary Figure R303.6.

Exterior stairs to a basement must have artificial illumination near the bottom landing.

The exception allows the light source to be installed over each individual stair section, thus eliminating the lighting over the landings.

RB102-13

Final Action: AS AM AMPC____ D

RB104-13
R202, R303.8

Proposed Change as Submitted

Proponent: Jonathan Siu, representing City of Seattle Department of Planning & Development (jon.siu@seattle.gov)

Revise text as follows:

SECTION R202
DEFINITIONS

COURT. A minimum 3-foot wide space on the *lot* on which a building is situated, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building. The distance shall be measured at a right angle from the face of the walls.

YARD. ~~An~~ A minimum 3-foot wide open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated. The distance shall be measured at a right angle from the face of the wall.

Revise as follows:

R303.8 Required glazed openings. Required glazed openings shall open directly onto a street or public alley, or a *yard* or court ~~located on the same *lot* as the building~~.

Exceptions:

1. Required glazed openings may face into a roofed porch where the porch abuts a street, *yard* or court and the longer side of the porch is at least 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
2. Eave projections shall not be considered as obstructing the clear open space of a *yard* or court.
3. Required glazed openings may face into the area under a deck, balcony, bay or floor cantilever provided a clear vertical space at least 36 inches (914 mm) in height is provided.

Reason:

1. The intent of the proposed change to the definition of "court" is to clarify that the court must be on the same property as the building under consideration. This aligns its definition with that for "yard", since "court" only appears in conjunction with "yard" in this code. This proposal also reinforces a general (but unstated) principle in all the I-codes that a building cannot rely on features on an adjacent property to demonstrate compliance with the code. That is, each building must demonstrate compliance within its own property lines unless specifically provided for in the code, such as in Footnote a to Table R302.1(2), or for spaces such as rights-of way.
2. The reason for adding the 3-foot dimension to the definitions for "yard" and "court" is that their minimum dimension is not defined. The 3-foot dimension was chosen because it is consistent with the requirements for minimum separation distance for walls (Table R302.1(2)) and for minimum width of a window well for emergency escape windows (Section R310.2). The requirement to measure the 3 feet perpendicular to the wall is copied from the definition for "Fire Separation Distance" in Chapter 2.

   Such a minimum dimension is needed to define what size yard or court is eligible for consideration of:

   A. What can be called a townhouse. The definition for "townhouse" states the dwelling unit must have a yard or public way on at least two sides. However, because the code does not define a minimum dimension for the yard, a designer can argue that a 1-foot or even a 1-inch distance constitutes a yard, and therefore, dwelling units close to the property line may be considered townhouses. (See Figure 1 below.) That interpretation does not agree with the commonly understood concept of what constitutes a townhouse, so this proposal provides clear guidance to the designer and the building official.

B. What can be used for light and ventilation. Section 303.8 requires that glazed openings used for light and ventilation open into a yard or court. Similar to the argument for “townhouse,” a minimum dimension is necessary because the current code provisions could be construed to allow these openings to comply by receiving light and ventilation from a very small space. It stands to reason that some minimum space is required in order to allow sufficient light and ventilation to enter through the opening.

C. What can be used for a pathway to get to a right-of-way from an emergency escape and rescue opening. Section 310.1 requires emergency escape and rescue openings to open “directly into a public way, or to a yard or court that opens to a public way.” However, an inadequate width of yard or court would render the emergency escape opening useless. Section R310.2 requires a minimum 3-foot wide window well for below-grade emergency escape and rescue openings, and if at least 3 feet is required for a window well, it stands to reason a yard or court should be at least 3 feet wide as well, in order to provide an adequate pathway to the right-of-way.

It is to be noted that defining a yard as having a width of at least 3 feet will not adversely affect sections different from those mentioned above where “yard” is used (Table R302.1(2), Section R303.8.1, and in Appendix M, Sections AM103.1.1 and AM103.1.3). “Court” is not used in any sections other than those mentioned above.

3. The text being proposed for deletion in Section R303.8 is redundant with the proposed definition of “court” and the existing definition of “yard.”

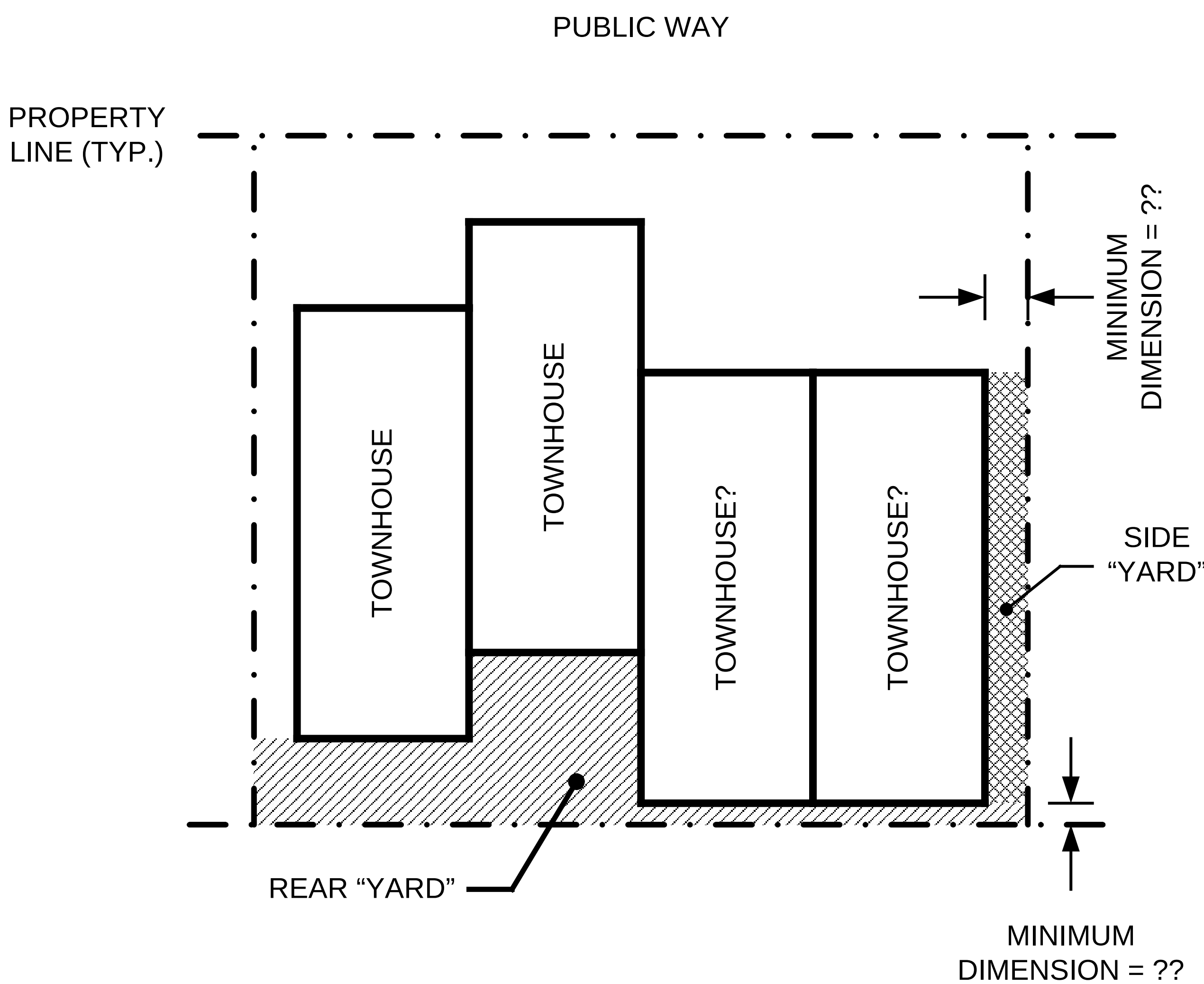


FIGURE 1 – PLAN VIEW

Cost Impact: Minimal, if any, increase to the cost of construction.

R303.8-RB-SIU

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal because it introduced technical requirements into a definition. Technical requirements are appropriate in the body of the code, but not in definitions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

COURT. A ~~minimum 3-foot wide~~ space on the *lot* on which a building is situated, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building. ~~The distance shall be measured at a right angle from the face of the walls.~~

YARD. ~~A minimum 3-foot wide~~ An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated. ~~The distance shall be measured at a right angle from the face of the wall.~~

R303.8 Required glazed openings. Required glazed openings shall open directly onto a street or public alley, or a *yard* or court. For compliance with Sections R303.8 and R303.8.1, the yard or court shall be at least 3 feet wide, measured at a right angle from the face of the walls.

Exceptions:

1. Required glazed openings may face into a roofed porch where the porch abuts a street, yard or court and the longer side of the porch is at least 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
2. Eave projections shall not be considered as obstructing the clear open space of a yard or court.
3. Required glazed openings may face into the area under a deck, balcony, bay or floor cantilever provided a clear vertical space at least 36 inches (914 mm) in height is provided.

R303.8.1 Sunroom additions. Required glazed openings shall be permitted to open into sunroom *additions* or patio covers that abut a street, *yard* or court if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening, and the ceiling height of the sunroom is not less than 7 feet (2134 mm).

R310.1 Emergency escape and rescue required. *Basements,* habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a minimum 3 foot wide *yard* or court that opens to a public way.

Exception: *Basements* used only to house mechanical *equipment* and not exceeding total floor area of 200 square feet (18.58 m2).

R310.5 Emergency escape windows under decks and porches. Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches (914 mm) in height to a *yard* or court that is at least 3 feet wide.

Commenter's Reason: This comment specifies that yards or courts must be at least 3 feet wide. The code doesn't provide minimum dimensions for purposes of determining the size of the yard required for emergency escape windows or for protection of glazing. The 3-foot dimension is consistent with the minimum separation distance for walls required in Table R302.1(2) and the minimum width of a window well for emergency escape windows in Section R310.2. These are the only pertinent places in the IRC where these terms are used.

The original proposal regarding the definition of "court" is modified in this comment to retain the provision stating that courts must be located on the lot on which the building is located but deleting the minimum dimension. As stated in the reason for the original proposal, buildings should not rely on features on adjacent properties to demonstrate compliance with the code. Each property must comply on its own unless the code specifically allows otherwise.

Public Comment 2:

Maureen Traxler, representing City of Seattle Dept of Planning & Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R101.2 Scope. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, *alteration*, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and <u>a *yard* or public way not less than 3 feet wide on at least two sides</u>; and their *accessory structures*.

Exceptions:

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

TOWNHOUSE. A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from foundation to roof ~~and with a *yard* or public way on at least two sides~~.

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: This comment answers the question of how large a yard must be in order for a townhouse-type building to be allowed under the IRC. A sketch was included with the original proposal that illustrates the problem. With the cost of property escalating, there is increasing pressure on owners to use as much of each lot as possible. Specifying the minimum yard size will assist both owners and building officials by making this threshold requirement explicit.

RB104-13

Final Action: AS AM AMPC____ D

RB108-13
R305.1, R305.1.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, ~~bathrooms, toilet rooms, laundry rooms~~ and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

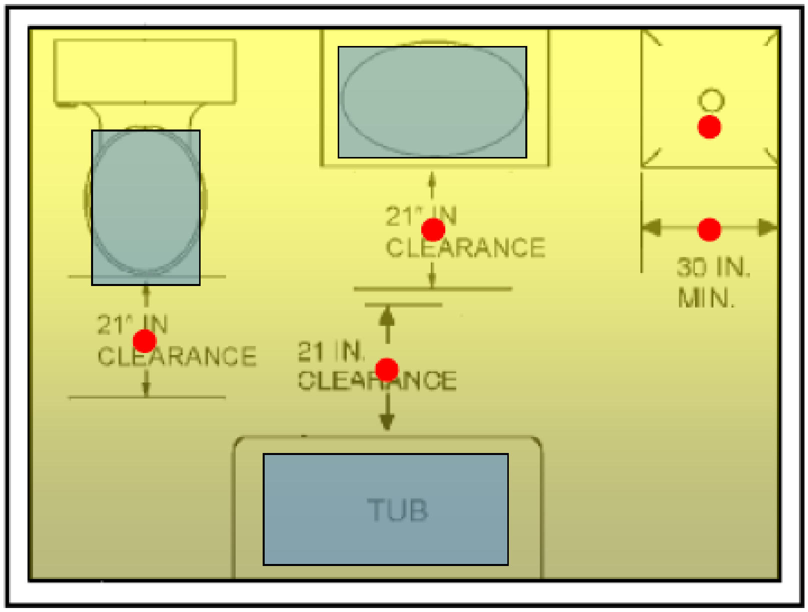
Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1.~~ The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*~~,~~ or hallways~~, bathrooms, toilet rooms and laundry rooms~~ shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: This proposal sets the required ceiling height for bathrooms, toilet rooms, and laundry rooms at 6 feet 8 inches. The current language requires ceiling heights in these spaces to be 7 feet. Then the exception allows the ceiling height to be 6 feet 8 inches in front of the fixtures (the most used area of the space) so the exception is really the rule. It only makes sense that the entire room be permitted to be 6 feet 8 inches, not just the most used areas of the room.



- 7" Ceiling height required.

- 6' 8" Ceiling height permitted.

- Fixture capable of being used.

Cost Impact: None

R305.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that, if the ceiling height can be 6'-8" in front of a plumbing fixture, why not the entire bathroom. This will provide more flexibility in basements. Laundries are similar to bathrooms in that their use is temporary and a lower ceiling in these types of spaces would not create an inconvenience or sacrifice health or safety concerns.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable* ~~*space*,~~ *spaces* and hallways~~, and portions of *basements* containing these spaces~~ shall have a ceiling height of not less than 7 feet (2134 mm). B~~athrooms, toilet rooms and laundry~~ Rooms that are not *habitable spaces* shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exceptions:

1. ~~For~~ Habitable rooms with sloped ceilings~~,~~ shall have at least 50 percent of the required floor area ~~of the room must have~~ with a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose.~~ Rooms that are not habitable spaces with sloped ceilings shall have a ceiling height of not less than 6 feet 8 inches over 50 percent of the provided floor area. Bathrooms and toilet rooms shall have not less than 6 feet 8 inches at the front of fixtures. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

~~**R305.1.1 Basements.** Portions of *basements* that do not contain *habitable space* or hallways shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).~~

~~**Exception:**~~

3. Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committees concerns. The BCAC thinks that RB108 (*approved as submitted)* has technical flaws and reads poorly. The BCAC recommends several changes:

507.1. As we interpret the proponent's change, he wants to allow 7' ceilings in all habitable spaces and hallways and 6'-8" ceilings in all other non-habitable spaces.

In our public comment we rewrote this section to more clearly differentiate the requirements between habitable rooms/hallways with other non-habitable rooms: bathrooms, toilet rooms, laundry rooms plus closets, utility rooms, etc.

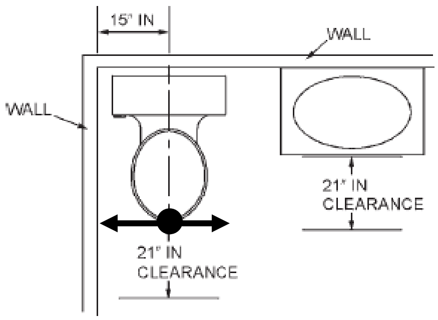
The BCAC tried to close a hole in the proponents proposal: what height are *other* non-habitable spaces, such as closets, utility rooms, corridors, storage rooms, etc, which were not mentioned – you don't know if they are supposed to be 6'-8" or 7'-0".

Exception 1: We tried to more clearly say that this exception only applies to habitable rooms and hallways with sloped ceilings. The existing language never applied to non-habitable rooms anyway, because they never had a "required floor area".

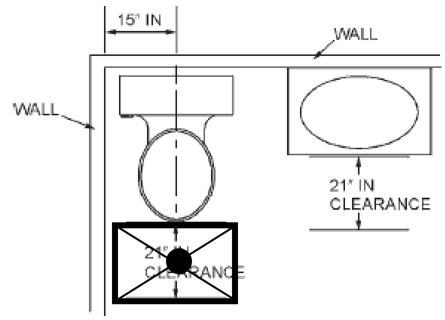
Exception 2 has flaws:

1. The proponent purposely eliminated the 6'-8" headroom requirement in front of bathroom and toilet room fixtures by striking the first sentence. He is relying on vague language that says that the headroom above the fixtures shall be such that it can accommodate the intended purpose of the fixture. THIS IS FUNDAMENTALLY WRONG! We are not designing for the "intended purpose" of the fixture, but rather the height of the user. The code has always designed for 6'-8" tall people (i.e. doorways, stairways, etc).
2. As currently approved, bathrooms and toilet rooms would have to have a minimum head room of 6'-8" and preclude many applications for powder rooms under stairs. Therefore we drafted a new first sentence to mirror exception 1, but for "other non-habitable rooms with sloped ceilings". Similar to exception 1, we added a provision that at least 50% of the *provided* floor area had to have at least 6'-8" headroom. We put back in the 6'-8" headroom requirement in front of fixtures for bathrooms and toilet rooms.
3. From the 2012 IRC: What does "center of the clearance area" really mean? I thought that this was perfectly clear, but after talking with others, I have found out that my interpretation was not universal. The existing language is confusing, and RB108, as submitted, does not rectify the issue.

Interpretation 1



Interpretation 2



Some folks would argue that the word "center" applies to the center of the *front* of the clearance area as in interpretation 1. I have always thought "center" applied to the center of the *clearance area*, as shown in interpretation 2 (i.e. half way back of the 21" clearance as measured from the edge of the fixture). Exception 2 was reworded to say that interpretation 1 is the intention.

R305.1.1

By changing the language in Section R305.1, Section R305.1.1 was no longer required.

We moved the exception up to number 3.

Public Comment 2:

Matt Black, Hampton city, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable spaces*~~,~~ and hallways ~~and portions of basements containing these spaces~~ shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms, ~~and~~ laundry rooms, closets, storage rooms and utility spaces shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. Bathrooms, toilet rooms, laundry rooms, closets, storage rooms and utility spaces with sloped ceilings shall have a ceiling height of not less than 6 feet-8 inches over 50 percent of the provided floor area or 35 square feet, whichever is the lesser. ~~The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose.~~ Bathrooms and toilet rooms shall have a ceiling height of not less than 6 feet 8 inches at the front of fixtures. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. Crawl spaces and attic spaces shall not have a minimum head room clearance.

~~**R305.1.1 Basements.** Portions of *basements* that do not contain *habitable space* or hallways shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).~~

~~**Exception:**~~

4. Beams, girders, ducts or other obstructions in basements may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Commenter's Reason: RB108 was approved by the Committee but it has an inherent oversight, and this public comment is to fill in the missing blanks. The author specified the ceiling height for bathrooms, toilet rooms and laundry rooms, but did not specify the height of functional spaces, like closets and storage rooms. It also addresses when no ceiling height is required: crawl spaces and attic spaces. This public comment covers these other situations and does not leave the reader in the doubt.

The *50 percent or 35 square feet* is based on two different conditions: If the room is greater than 70 square feet, all you need is 35 square feet of ceiling at 6'-8"; if the room is like a powder room under a stair and is less than 70 square feet, the minimum area would be half of the floor area. In either case, you would need 6'-8" in front of any fixtures. The language of fixtures and their "intended purpose" is extremely vague and not consistent with good code language, and has been replaced.

Public Comment 3:

Michael D. Fischer, Kellen Company, representing American Institute of Building Design, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise as follows:

SECTION R305
CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, ~~bathrooms, toilet rooms, laundry rooms~~ and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). <u>Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).</u>

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1. The ceiling height above <u>bathroom and toilet room</u> fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. <u>Beams,girders, ducts or other obstructions in basements containing habitable space shall be permitted to project to within 6 feet 4 inches (1931mm) of the finished floor.</u>

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*, <u>or</u> hallways, ~~bathrooms, toilet rooms and laundry rooms~~ shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Commenter's Reason: During the past several code cycles, there have been numerous changes to the ceiling height and support beam projection height for habitable spaces in basements. This creates an issue when homes built to the previous standards include beams located in unfinished basements at heights that would allow the conversion to habitable space. Once the code changes, these spaces no longer fit the dimensions, and the option to convert this "future finished basement" evaporates. Rarely do codes become retro-active to previous construction, but this is one case where code changes can affect existing designs.

The 2003 IRC allowed ceiling heights in habitable basement spaces to be at 7 feet above the finished floor (a.f.f.), and beams could project 6 inches lower than the ceiling (to 6'6"). Non-habitable spaces in basements could have ceilings at 6'8", with beams at 6'4". Designers could set the non-habitable basement ceiling height at 7', with beams at 6'6", knowing that the space could later be converted to habitable space.

The 2009 IRC removed the 6" projection below the ceiling height as an option. Under this change, designers would have no option for any beam heights below 7' in any habitable basement space. Beams could be located at 6'4" in non-habitable basements. The proposed modification would reinstate the option to accommodate beams and girders in basements containing habitable spaces. With this language added, the designer can establish the ceiling height of an unfinished basement at 7 feet, while setting the beam height at 6'4" a.f.f., thus allowing for the basement to be converted to habitable space.

There are numerous reasons why restoring this design option make sense. Allowing ducts to be located within conditioned basement space can help improve the energy efficiency of the home, and finishing basements to add living space is an important design option- saving space and optimizing the available floor area. The sloped ceiling option would theoretically allow the designer to encase beams within sloped ceilings that are permitted to be as low as 5 feet a.f.f., so restoring this option does nothing to adversely impact ceiling clearances. This option provides greater design flexibility and versatility of the space, while maintaining appropriate levels of safety.

RB108-13

Final Action: AS AM AMPC____ D

RB109-13
R307.2

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Roger Harper, Louisa County, VA, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA), Virginia Building Code Officials Association (VBCOA) and ICC Region 7 (sharper@louisa.org); Richard Grace of Fairfax County representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Delete and substitute as follows:

~~**R307.2 Bathtub and shower spaces.** Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.~~

R307.2 Bathtub and shower floors and walls. Bathtub floors, shower floors, wall areas above built-in tubs that have installed shower heads and walls in shower compartments shall be constructed of smooth, corrosion-resistant and nonabsorbent waterproof materials. Wall materials shall extend to a height of not less than 6 feet (1829 mm) above the room floor level and not less than 70 inches (1778 mm) above the drain of the tub or shower. Such walls shall form a water-tight joint with each other and with either the tub or shower floor.

Reason: This revised language was approved for the 2015 IPC. There is no reason for the two codes to have different language.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was Item no. X8 on the PMGCAC IRC-P list.

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

R307.2-RB-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that determining the height of a finish material above a point that is hard to measure from, such as sloped floors near drains, would be difficult and would create disagreements between those that are attempting to comply with the code and those that are enforcing it. The measurement should be made from a readily identifiable point so that it can be easily verified.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), and ICC Region VII, requests Approval as Submitted.

Commenter's Reason: The new language in this change clarifies that the finish material within the bathtub floor and shower areas must be smooth, corrosion resistant, and nonabsorbent waterproof materials. The previous language only stated nonabsorbent surface. The committee's reason for disapproval was that the point of measurement was not clear however that is what this change was written to do. The current language states 6' above the floor. What floor was this measurement to be taken from the shower or tub floor or the floor just outside of these areas? The new language requires a minimum of 6' of smooth, corrosion resistant and nonabsorbent waterproof materials above the room floor level and not less than 70" above the drain of the tub of shower. This language does provide a readily identifiable point. Again this language would make the IRC and IPC language consistent.

RB109-13
Final Action: AS AM AMPC____ D

RB111-13
R308.4.2

Proposed Change as Submitted

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

Revise as follows:

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered a hazardous location ~~where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where~~ if the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface ~~shall be considered a hazardous location~~ and it meets either of the following conditions:

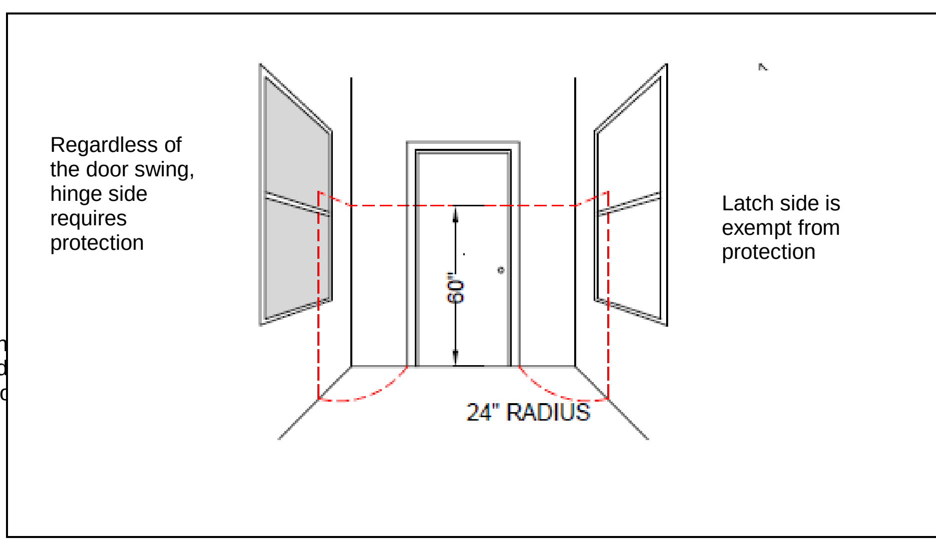
1. Where the glazing is within 24" of either side of the door in the plane of the door in a closed position,
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24" of the hinge side of an in-swinging door.

Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. ~~Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position~~
4. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.
5. Glazing that is adjacent to the fixed panel of patio doors.

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

Exception 3: Currently the code requires safety glazing for windows on the hinge side of walls perpendicular to the door plane – regardless of the door swing. See sketch below.



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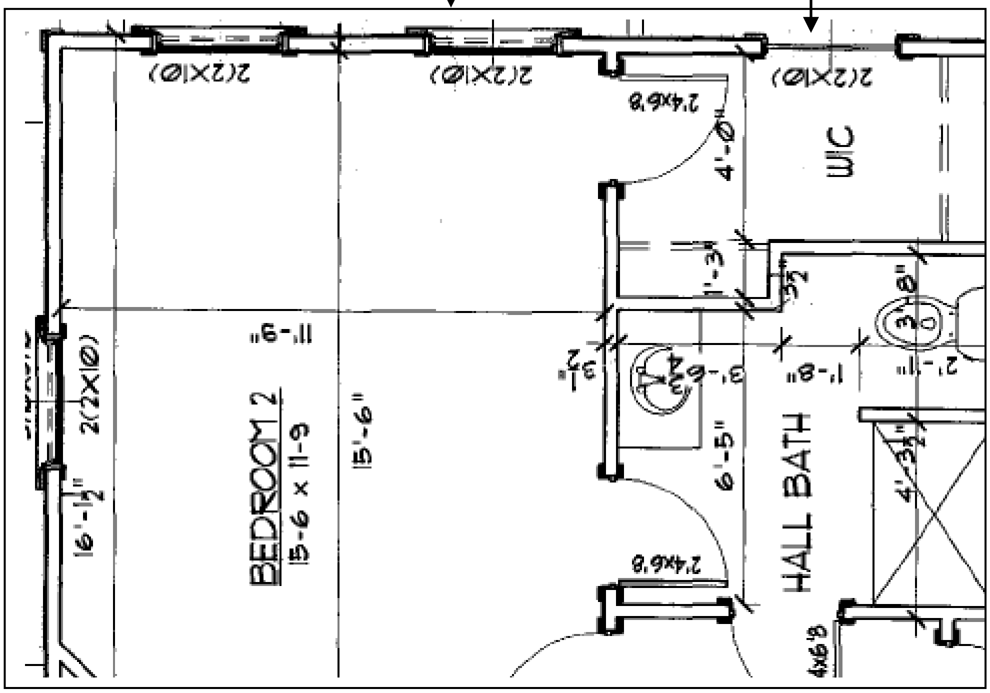
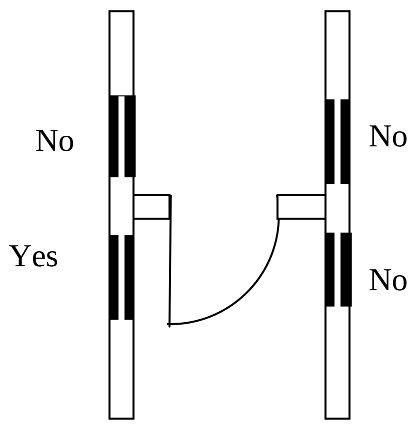
Currently this window is NOT exempt by rule # 3 (or #4) and would have to be safety glazed. If this proposal is accepted, this window would NOT have to be safety glazed.

This window is currently exempt because the arc is more the 24" from the door hinge.





These are the four possible configurations of windows adjacent/perpendicular to a door. Only the one with an in-swinging door on the hinge side would be required to be safety glazed.

Cost Impact: This proposal may decrease the cost of construction.

R308.4.2 #1-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that the square foot area and height limits are intended to maintain a lesser mass that is appropriate for an accessory structure, and to coordinate with previous committee action on ADM2.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface shall be considered a hazardous location.

Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position.
4. Glazing in walls on the hinge side of and perpendicular to the plane of the door in a closed position and where the walls are in the direction opposite the door swing.

~~4~~ 5. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.

~~5~~ 6. Glazing that is adjacent to the fixed panel of patio doors.

Commenter's Reason: The committee approved the original proposal as submitted, but also noted that some details and wording should be addressed through public comment. The original proposal for R308.4.2 Item 1 appears to require safety glazing within 24" of either door edge only when the glazing is in the plane of the door. Item 2 requires safety glazing within 24" of the hinge side of an in-swinging door when the glazing is perpendicular to the plane of the door. The original proposal does not seem to address glazing in a wall that is not in the plane of the door nor perpendicular to the plane of the door. In other words, there is no requirement for glazing in a wall that is offset from the plane of the door but within the 24" arc, or in a wall that forms an angle between 90 and180 degrees with the plane of the door.

It is agreed with the original proposal that when the windows are perpendicular to a door, only the window on the hinge side of an in-swinging door would be required to be safety glazed. However, when the glazing is offset from the plane of the door or between 90 and 180 degrees to the plane of the door, the glazing and the wall containing the glazing are no longer parallel to the direction of travel to the door user, and the risk of impact would be greater.

The proposed modifications in this public comment would restore the original code language that requires safety glazing within a 24" arc. The proposed Exception 4 clarifies the exemption for glazing perpendicular to the plane of the door that is opposite the door swing direction.

RB111-13

Final Action: AS AM AMPC____ D

RB114-13
R308.4.6, R308.4.7

Proposed Change as Submitted

Proponent: Tim Pate, City and County of Broomfield, CO representing Colorado Chapter Code Change Committee

Revise as follows:

R308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered a hazardous location.

Exceptions:

1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above walking surface. The rail shall be capable of capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1 ½ inches (38 mm) in cross sectional height and the plane of glass is more than 18 inches (457 mm) horizontally from the rail.
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the landing and within 60 inches (1524 mm) horizontally of the bottom tread shall be considered a hazardous location.

Exception: The glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Reason: All of the previous editions of the IRC required glazing that was had bottom edge below 60 inches above the plane of walking surfaces of stairways, landings between flights of stairs and ramps, and adjacent to stair landings to be approved safety glazing. Code change was approved which changed the 36 inches back to 60 inches. There was a comprehensive code change (S218 09/10) that reformatted the entire safety glazing section and also changed the dimension from 60 inches down to 36 inches. This was approved and overrode my code change.

My reason statement for the code change during the 2009/2010 cycle was very clear in helping clean up the inconsistencies in the earlier codes. As you can see it specifically required the wall with glazing to be at least 18 inches away. The reason statement that the IRC change committee gave in approving the comprehensive change was that it should be lowered to 36" which would match the exception. I could never find a good reason as to why my code change that was approved by the IRC committee did not stand and get incorporated into the overall change also approved by the IRC code change committee.

I am copying my code change (RB40-09/10) and reason statement that the2009/2010 IRC committee agreed with:

Revise as follows:

R308.4 The following shall be considered specific hazardous locations for the purposes of glazing:

Items 1 through 6 remain unchanged

7. Glazing adjacent to stairways, landings, and ramps within 36 inches (914 m) horizontally of a walking surface when the exposed surface of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.

 Exceptions:

 1. ~~When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per lineal foot (730 N/m) without contacting the glass and be a minimum of 1 ½ inches (38 mm) in cross sectional height.~~
 2. The side of the stairway has a guard~~rail~~ or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or

3. When a solid wall or panel extends from the plane of adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard and the plane of the glazing is more than 18 inches (457 mm) from the wall or panel.

8. Glazing adjacent to stairways within 60 inches (1524 m) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glazing is less than 60 inches (1524 mm) above he nose of the tread.

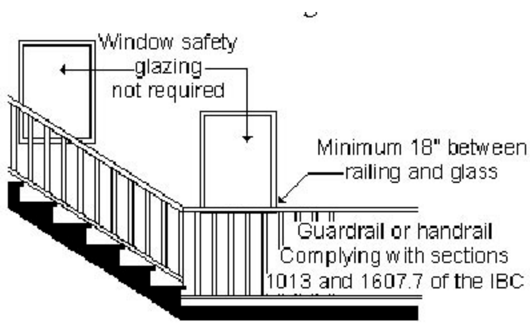
Exceptions:

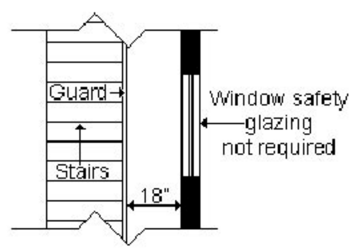
1. The side of the stairway has a guard~~rail~~ or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or
2. When a solid wall or panel extends from the plane of adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard and the plane of the glazing is more than 18 inches (457 mm) from the wall or panel.

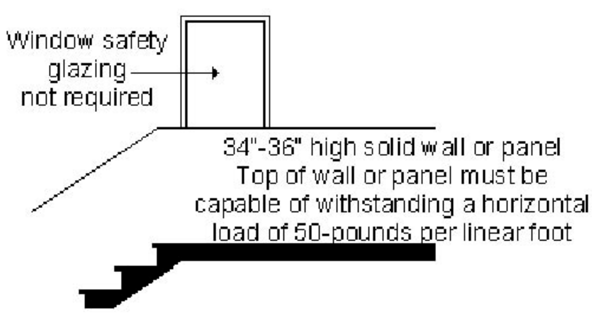
Reason: Code change RB15-00 added exception 9 (9.1 and 9.2) which allowed the protective bar but also required the glazing to be at least 18" away from the stair and bar. Code change RB16-00 was also approved in the same code change cycle which added the reference in exception #5 which would allow the protective bar but not require the 18" separation. This created a direct conflict between the two exceptions in the 2003 IRC and the 2006 IRC. IRC Section R308.4 was modified for the 2009 IRC by reformatting the requirements and exceptions in order to make it more user friendly but no technical changes were made.

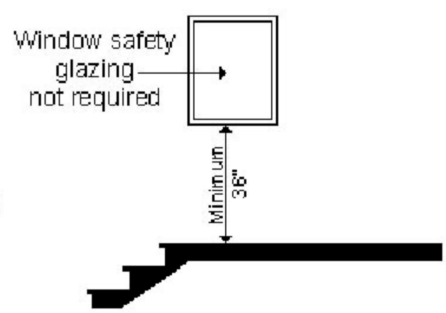
Stairs are inherently more dangerous for tripping hazards than normal walking surfaces. It does not make sense to a allow 1 ½" wide bar or a solid wall directly adjacent to stairs and landings and think this gives adequate protection for someone falling into glazing that is not safety glazing. Requiring the glazing to be at least 18" away would provide better protection if someone trips and falls which is exactly what 2009 IRC section R308.4 #7 Exception 2 requires.

The following diagrams illustrates what R308.4 #7 exception 2 allows which is the guard or handrail but also the 18" separation which is in conflict with what is allowed in #7 exception 1 or 3 which allows a rail or solid wall but does not require the 18" separation.









I was also successful in having the IBC safety glazing section changed back to 60 inches during the past Code Change Hearing in Dallas for the 2015 IBC. Here is the code change (S297-12) to IBC along with the reason statement – this code change was approved by Structural Code Change Committee and was not challenged at Final Action Hearings and therefore was approved on the consent agenda:

Revise as follows:

2406.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than ~~36 inches (914 mm)~~ <u>60 inches (1524 mm)</u> above the landing and within a 60 inches(1524 mm) horizontally of the bottom tread shall be considered a hazardous location.

Reason: Previous editions of the IBC before the 2012 required glazing that is less than 60" above the landing to be approved safety glazing. It is not clear why this requirement was changed in the 2012. It does not make sense that section 2406.4.6 applies to glazing that is less than 60" above the stairs and intermediate landings but the glazing at bottom landing is treated differently – only when below 36" The potential for falling through the glazing at bottom landing is the same. This change will bring back the 60" height which will then match the requirement at intermediate landings and stairs.

Both 2012 IBC sections 2406.4.6 and 2406.4.7 have exceptions which allow a guard but require the plane of glass to be at least 18" away from the guard.

This code change should be approved in order to make sure that people who use stairs, ramps, and landings remain safe in case they trip and fall and potentially fall through windows adjacent to the stairs and ramps. I do not feel that only protecting glazing that is below 36" above walking surface is adequate but that all glazing below 60" should be protected. The vast majority of people will have their hands and arms outstretched if falling at 48" or so high and would be falling through glass at this height or somewhat higher. Approving this code change will get both the IRC and IBC to match which is extremely important.

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

R308.4.6-RB-PATE

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposal because they felt that there was no justification for the change. If a guard of similar dimensions is good for a stairway, it should be good here too.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Approval as Submitted.

Commenter's Reason: I agree with the IRC code change committee that there has been an exception that allowed glazing that was protected by a rail located between 34" and 38" high above the walking surface. The code change that I had approved by the past IRC committee (as explained in my original reason statement) and then over turned by another larger code change attempted to fix this problem. It just does not make sense to think that a rail located at that height will keep someone from falling into and potentially through glazing. The code requires glazing that is adjacent to bathtubs, showers, etc. to be at least 60" above the floor – it does not make sense to not treat potential trip and falls at stairs and landings the same way.

The requirement for requiring the plane of glass to be at least 18" away from the rail in section R308.4.6 should also match the exception that is already located in section R308.4.7 so the two sections have consistency. The potential for falling through glazing is the same at the bottom stair landing as it is at the sides of stairs.

Finally I would reiterate that this same language was approved by the IBC Structural code change committee and will now be in the 2015 IBC for hazardous locations of glazing. It is imperative that the requirements for requiring safety glazing be the same in both the IBC and the IRC. Stairs and glazing do not know which code they fall under and the potential for severe injuries and potential death are the same when someone falls and hits glass by stairs and landings. Please remember that you will have the same sets of stairs located in single family homes and townhouses located within the same development as multifamily apartments or condos and these requirements should be the same.

As a Code Official these inconsistencies make it extremely difficult to explain why these sections and codes are different.

Public Comment 2:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Submitted.

Commenter's Reason: The proponent is making changes to correlate the IBC and IRC requirements for glazing adjacent to stairways, landings and ramps. The proposal provides consistency between the IBC and IRC and eliminates confusion of code intent.

RB114-13

Final Action: AS AM AMPC____ D

RB115-13
R308.4.7

Proposed Change as Submitted

Proponent: Tim Pate, City and County of Broomfield, CO representing Colorado Chapter Code Change Committee

Revise as follows:

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm above the landing and within <u>a</u> 60 inch~~es~~ (1524 mm) ~~horizontally of~~ <u>horizontal arc less than 180 degrees from</u> the bottom tread <u>nosing</u> shall be considered a hazardous location.

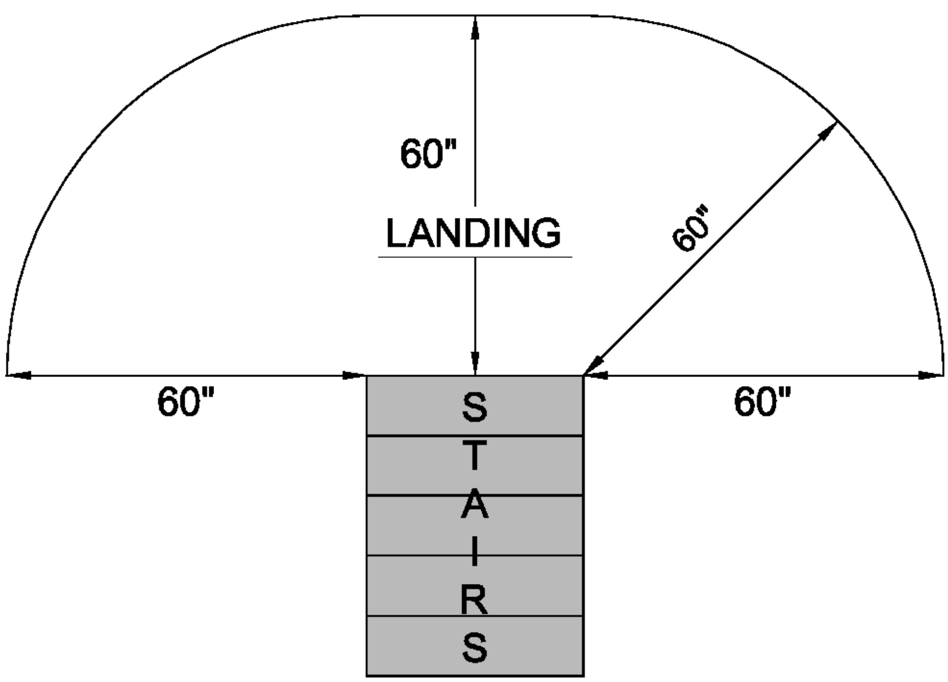
> **Exception:** The glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Reason: Previous editions of the IRC before the 2012 required glazing that is 60" horizontally in any direction to be approved safety glazing. It is not clear why this requirement was changed in the 2012. The previous editions had the additional wording "in any direction" when applying the 60" horizontal rule. This is due to the "splay" factor for when someone gets to the last tread and falls. The tendency is for someone to flail out in any direction.

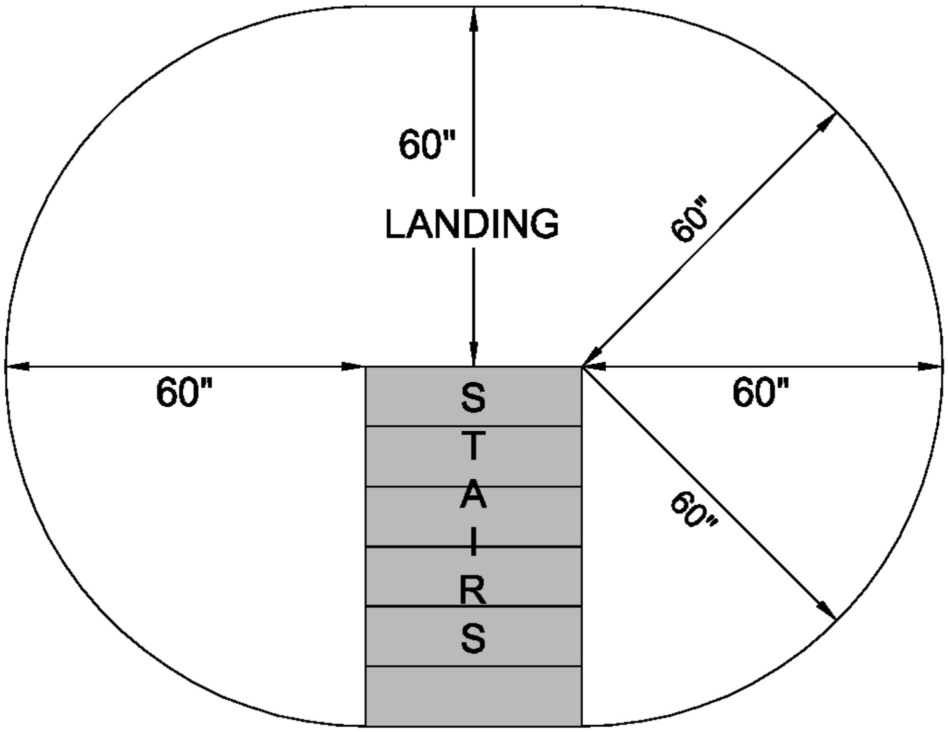
This added wording will make this section only apply to any glazing that is in a wall that is less than 180 degrees from the bottom tread nosing. I believe that adding the wording which would limit the area needing safety glazing to any glazing that falls within a 180 degree arc from bottom tread nosing and extending out 60" makes more sense since it is extremely unlikely that someone will fall out and backwards. I have added an illustration which should help everyone see what this changed wording will do.

Please note that there is still a requirement to provide approved safety glazing when located within 36" horizontally of the sides of the stairs.

The new code language will incorporate the areas shown in the following diagram:



The current code language incorporates the area shown below in the diagram:



This same code change proposal was reviewed and approved at the Final Action Hearings for the 2015 IBC – therefore this proposal for the IRC will get the two code sections to match which is important for consistency.

Cost Impact: This code change will reduce construction cost.

R308.4.7-RB-PATE

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that, in this case, it is beneficial for the International Residential Code and the International Building Code to be coordinated. This language is preferable to other code changes that address similar code requirements. It would be nice if the drawing could be included in the code along with the language.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tim Pate, City and County of Broomfield, representing Colorado Chapter Code Change Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Add the following figure to the proposal:

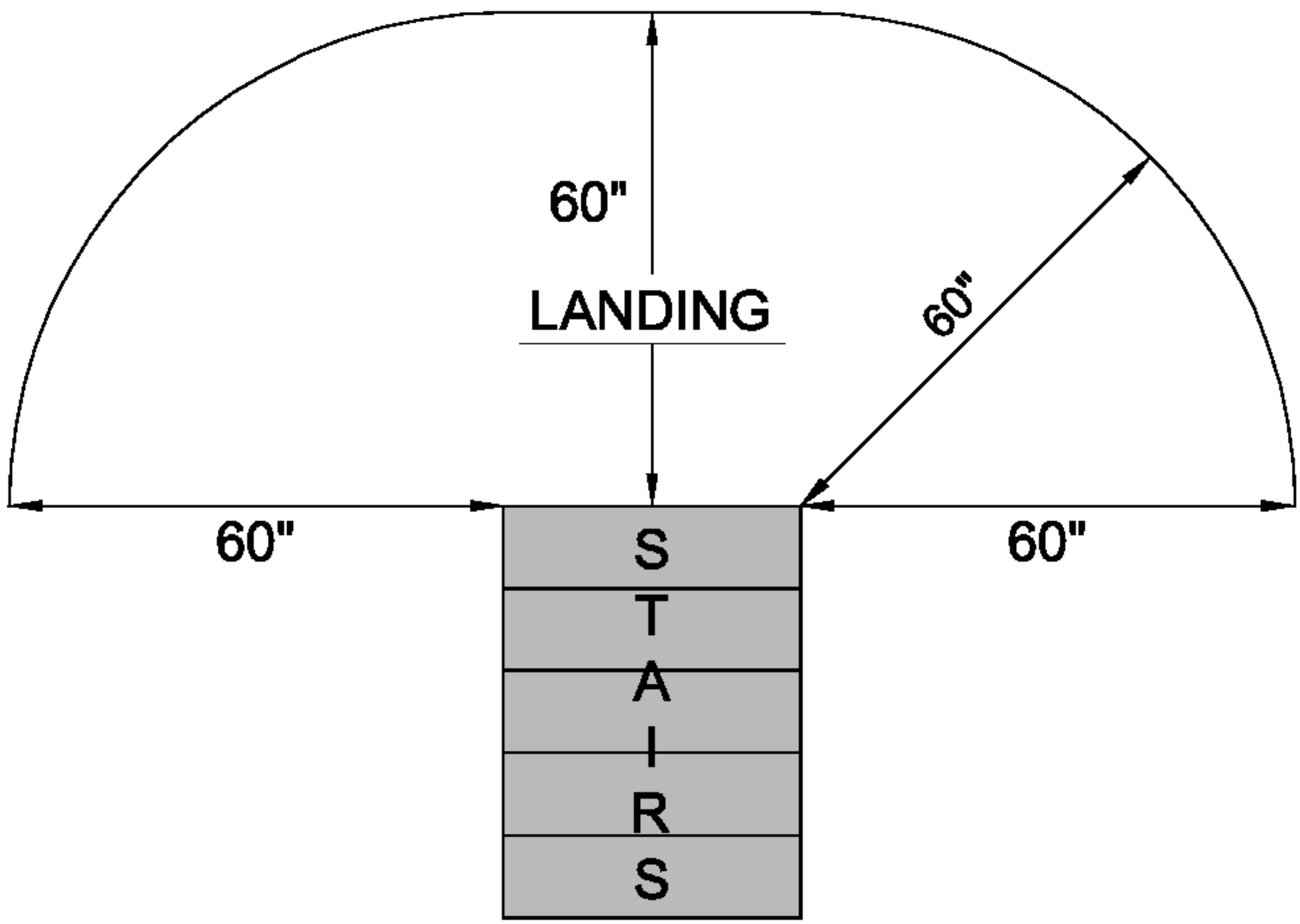


Figure R308.4.7

(Portions of proposal not shown to remain unchanged)

Commenter's Reason: Based on the recommendation from one of the IRC Code Change Committee members when approving my original code change proposal I suggest that the figure I provided in my original code change reason statement be added as a figure within the body of the Code so as to help code users understand the new code language – " a 60 inch horizontal arc less than 180 degrees from the bottom tread nosing …"

RB115-13

Final Action:	AS	AM	AMPC____	D

RB117-13
R310

Proposed Change as Submitted

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

Delete and substitute as follows:

R310
EMERGENCY ESCAPE AND RESCUE OPENINGS

~~**R310.1 Emergency escape and rescue required.** Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue opening shall be required in each sleeping room. Where emergency escape and rescue openings are provided, they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency and escape rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.~~

> ~~**Exception:** Storm shelters and basements used only to house mechanical equipment not exceeding total floor area of 200 square feet (18.58 m2)~~

~~**R310.1.1 Minimum opening area.** All emergency and escape rescue openings shall have a minimum met clear opening of 5.7 square feet.~~

> ~~**Exception:** Grade floor openings shall have a minimum net clear opening of 5 square feet.~~

~~**R310.1.2 Minimum opening height.** The minimum net clear opening height shall be 24 inches.~~

~~**R310.1.3 Minimum opening width.** The minimum net clear opening width shall be 20 inches (508 mm).~~

~~**R310.1.4 Operational constraints.** Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.~~

~~**R310.2 Window wells.** The minimum horizontal area of the window well shall be 9 square feet (0.9 m2), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.~~

> ~~**Exception:** The ladder or steps required by SectionR310.2.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.~~

~~**R310.2.1 Ladder and steps.** Window wells with a vertical depth greater than 44 inches (1118 m) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm)on center vertically for the full height of the window well.~~

~~**R310.2.2 Drainage.** Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.~~

> ~~**Exception:** A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.~~

~~**R310.3 Bulkhead enclosures.** Bulkhead enclosures shall provide direct access to the basement. The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by Section R310.1.1. Bulkhead enclosures shall also comply with Section R311.7.8.2.~~

~~**R310.4 Bars, grilles, covers and screens.** Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.~~

~~**R310.5 Emergency escape windows under decks and porches.** Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.~~

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

> **Exception:** Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m2)

R310. 1.1 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

R310.2 Emergency escape and rescue openings. Emergency and escape rescue openings shall have minimum dimensions as specified in this section.

R310.2.1 Minimum opening area. All emergency and escape rescue openings shall have a minimum net clear opening of 5.7 square feet. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The minimum net clear height opening shall be 24" and the minimum net clear width shall be 20"

> **Exception:** Grade floor or below-grade openings shall have a minimum net clear opening of 5 square feet.

R310.2.2 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; if the sill height is below-grade, it shall be provided with a window well in accordance with Section R310.2.3.

R310.2.3 Window wells. The minimum horizontal area of the window well shall be 9 square feet (0.9 m2), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section R310.2.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.

R310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 m) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm)on center vertically for the full height of the window well.

R310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be installed under decks and porches provided the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.

R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side hinged door or a slider. Where the opening is below the adjacent ground elevation, it shall be provided with a bulkhead enclosure.

R310.3.1 Minimum door opening size. The minimum net clear height opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section R310.2.1.

R310.3.2 Bulkhead enclosures. Bulkhead enclosures shall provide direct access from the basement. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position.

R310.3.2.1 Drainage. Bulkhead enclosures shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for bulkhead enclosures is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.4 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

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

This code change is primarily for reorganizational purposes. It separates emergency escape and rescue openings (EERO) window and door provisions, which are currently intermingled. It also says that EERO doors do not have to be "egress" doors, that is, side hinged doors. The new code language allows sliders from basements.

Most people think of emergency escape and rescue openings as windows, and in fact, the current subsections in R310 all seem to define and quantify this type of application: minimum opening height, minimum opening width, window wells, ladders and steps from window wells, drainage from window wells, bars and grilles on windows, windows under decks.
However the most basic EERO is a door. In case of a fire, would prefer to exit through a door or a window? Will a fire fighter prefer to enter through a door or a window?

This revision acknowledges doors as a viable EERO and defines the minimum requirements for EERO doors. It allows side hinged doors or sliders to be used as EEROs.

An EERO door would not have to be an egress door but an egress door would automatically be an EERO door.

Cost Impact: None

R310.1-RB-BAJNAI-BCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it reorganized the code text in a manner that clarifies the code. While the application to doors is implied in the existing text, it is good to point it out.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R310
EMERGENCY ESCAPE AND RESCUE OPENINGS

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception: Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m^2).

R310. 1.1 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

R310.2 Emergency escape and rescue openings. Emergency and escape rescue openings shall have minimum dimensions as specified in this section.

R310.2.1 Minimum opening ~~area~~ <u>size</u>. All emergency and escape rescue openings shall have a minimum net clear opening of 5.7 square feet. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The minimum net clear height opening shall be 24" and the minimum net clear width shall be 20".

Exception: Grade floor ~~or below-grade~~ openings shall have a minimum net clear opening of 5 square feet.

R310.2.2 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; if the sill height is below-grade, it shall be provided with a window well in accordance with Section R310.2.3.

R310.2.3 Window wells. The minimum horizontal area of the window well shall be 9 square feet (0.9 m^2), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section ~~R310.2.1~~ R310.2.3.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.

R310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 m) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm) on center vertically for the full height of the window well.

R310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section ~~R504.1~~ R405.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be installed under decks and porches provided the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.

R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side hinged door or a slider. Where the opening is below the adjacent ground elevation, it shall be provided with a bulkhead enclosure.

R310.3.1 Minimum door opening size. The minimum net clear ~~height~~ opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section R310.2.1.

R310.3.2 Bulkhead enclosures. Bulkhead enclosures shall provide direct access from the basement. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position.

R310.3.2.1 Drainage. Bulkhead enclosures shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section ~~R504.1~~ R405.1 or by an approved alternative method.

Exception: A drainage system for bulkhead enclosures is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.4 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Section~~s R310.1.1 to R310.1.3~~ R310.2.1, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The committee approved the original proposal as submitted.

The proposed modifications in this public comment mainly address editorial changes due to code text reorganization and section renumbering.

This public comment also addresses the 5 square feet exception to the 5.7 square feet minimum opening area. In the original proposal, the exception that allows 5 square feet for grade floor openings is also extended to below-grade openings. Only openings at grade level would be able to afford easier access for emergency escape and rescue that would justify reducing the minimum net clear opening to 5 square feet. Openings below grade would require greater efforts and should meet 5.7 square feet minimum opening area.

RB117-13

Final Action: AS AM AMPC____ D

RB122-13
R310.1.5 (New)

Proposed Change as Submitted

Proponent: Jeff Inks, Window and Door Manufacturers Association, representing the Window & Door Manufacturers Association.

Add new text as follows:

R310.1.5 Replacement windows. Replacement windows installed in buildings meeting the scope of this code shall be exempt from the maximum sill height requirements of Sections R310.1 and Sections R310.1.1, R310.1.2, and R310.1.3 provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.

Reason: First, while this provision is applicable to existing construction (for the reasons stated below), it is being proposed for inclusion in the main body of the IRC because window replacements are more common than other significant changes made to existing one- or two-family homes and townhomes, and in addition, for consistency with what is being proposed for IRC Appendix J and IEBC Chap 7 by us and the ICC CTC.

The proposed provisions and language are also based on Minnesota's residential code which does effectively incorporate the provisions into the main body of the code in the same location (R310.1.5) being proposed above.

The provisions and language have also already been approved for IEBC Chap. 4 which occurred during the Group A proceedings.

Most importantly, it's important to note that the provisions do not allow for any decrease in safety and rather will help ensure improvements in safety can be made.

More specifically, the intent of this proposal is to ensure that the IRC does not discourage or prevent improvements in emergency escape and rescue openings, especially for fire safety, in older residential occupancies by requiring replacement windows to meet all of the provisions of Section 310 when doing so can only be accomplished by increasing the size of the rough opening or altering the interior wall.

Because many of these older buildings were constructed under codes that did not include the same emergency escape and rescue opening provisions that the IRC now requires for new construction, the only way to fully meet all of the requirements of Section 310 for new construction if required when windows are replaced is to enlarge the rough opening and/or make significant alterations to the interior wall in order to accommodate any increase in window size or lowering of a sill.

At the very least, the significant cost and design challenges of altering the rough opening and/or interior wall can discourage or prevent window replacement and at worst can discourage or prevent the replacement of older windows that are harder to operate or are inoperable all together because of their age or poor maintenance and, that are significantly less energy efficient. When that happens, improvements to safety as well as energy efficiency are needlessly compromised.

Furthermore and on the whole, while some bedroom windows in older homes may not provide the full clear opening that is required for new construction or may have a sill height above 44 inches, they nonetheless still provide a viable emergency and escape rescue opening which is the primary intent of the code. Replacement of these windows with the same type of operating window or other type that can provide an equal or greater clear opening than the existing window -- even if they do not fully meet the clear opening or sill height requirements of Section 310 – is always an improvement in safety, especially when a replacement opening can provide a larger clear opening than the existing window. Such improvements in safety should not be discouraged or prevented by overly onerous requirements for replacement windows.

This proposal will help ensure that doesn't happen by providing limited exceptions to the requirements of Section 310 that can only be applied when certain conditions are met and that as already noted, will not result in a decrease in safety.

The requirements for new construction that emergency escape and rescue openings be provided as well as the operational requirements of Section 310.1.4 are maintained and still applicable to replacement windows.

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

R310.1.5 (NEW) #1-RB-INKS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposal because they felt that, although there are difficulties in replacing existing windows, the existing building provisions are a location where it might be appropriate to state conditions where full compliance is required versus some relief. Some older residences had windows for ventilation only that have sill heights that are 52" or are 3 by 3 double-hungs. At some point we need to address emergency escape and rescue openings where there is an opportunity. Where requirements are too restrictive it will discourage the maintenance and upkeep of older homes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeff Inks, representing Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: While these same provisions have been approved for the IRC Appendix J (RB-467) and the IEBC Chapter 7 (EB-15) for the reasons stated in those proposals, we are still requesting for approval as submitted of this proposal for the inclusion of them in the main body of the IRC for jurisdictions that do not adopt Appendix J.

The provisions are critical to providing needed, reasonable replacement requirements for EERO windows that do not discourage or prevent EERO window replacements while at the same time ensure there is no reduction in safety (as discussed in the above reason statement for the proposal). Jurisdictions that do not adopt Appendix J will lack these provisions, which is why we have also proposed them for inclusion in Chapter 3. Including them in Chapter 3 clarifies the applicability of **Section R102.7.1, Additions, alternations or repairs,** with respect to EERO window replacements.

We therefore urge approval as submitted for the reasons stated in the proposal to ensure these provisions are in place for all jurisdictions that adopt the IRC regardless of whether or not they adopt Appendix J

RB122-13
Final Action: AS AM AMPC____ D

RB124-13
R310.6 (New), R310.7 (New)

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R310.6 Dwelling additions. Where dwelling additions occur that contain sleeping rooms, an emergency escape and rescue opening shall be provided in each new sleeping room. Where dwelling additions occur that have basements, an emergency escape and rescue opening shall be provided in the new basement.

Exceptions:

1. An emergency escape and rescue opening is not required in a new basement that contains a sleeping room with an emergency escape and rescue opening.
2. An emergency escape and rescue opening is not required in a new basement where there is an emergency escape and rescue opening in an existing basement that is accessible from the new basement.

R310.7 Alterations or repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo alterations or repairs.
Exception: New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with R310.1.

(Portions of proposal not shown remain unchanged)

Reason: There continues to be confusion in the code enforcement community as to the requirements for emergency escape and rescue opening requirements as they apply to existing basements and additions. Hopefully this proposal will make it clearer that emergency escape and rescue openings are only required in additions if there are sleeping rooms and/or a basement and then only if the new basement does not have a sleeping room or access to an emergency escape and rescue opening in the existing basement. Furthermore, this amendment is intended to clarify that existing basements that do not undergo expansion and where no sleeping rooms are added need not have emergency escape and rescue openings installed when remodeling occurs. At least in our area, code officials sometimes require emergency escape and rescue openings be installed when basements are finished or remodeled even when no sleeping rooms occur. This was never the intent of the code.

Cost Impact: None

R310.6 (NEW)-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it improves the clarity of the code with regard to existing buildings. Some requirements might be better located elsewhere in the code, but this is an improvement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Joseph Day III and Marc St. Jean, DBOA President, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R310.7 ~~Alterations or~~ repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo ~~alterations or~~ repairs.

> ~~**Exception:** New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with R310.1.~~

Commenter's Reason: The elimination of an emergency escape and rescue opening for alterations to existing basements weakens the code and the fire safety of the occupants of the dwelling and of the firefighters who will respond to the dwelling in the event of a fire. The conversion of an existing basement into habitable space falls under the definition of alteration. Allowing this type of alteration without requiring the installation of an emergency escape and rescue opening and reduces weakens the code by allowing the dwelling to be less safe after the alterations than its existing condition.

RB124-13

Final Action: AS AM AMPC____ D

RB129-13
R311.7

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Add new text as follows:

R311.7 Stairways. Stairways serving a dwelling or accessory structure shall comply with this section. This shall include, but shall not be limited to, exterior stairs from a dwelling or garage to grade and those stairs serving decks, porches, balconies, sun rooms, and similar structures.

Exceptions:

1. Stairs serving attics or crawl spaces.
2. Stairs that only provide access to plumbing, mechanical, or electrical equipment.
3. Stairs that serve structures or spaces used by children as play areas.

Reason: When reading Section R311 of the IRC regarding stairs, the language supports only two interpretations on how stairs are regulated. Those two interpretations are that either all stairs must comply with the section or only those stairs that are a part of the means of egress should comply. There is no other language that allows vacillation between those interpretations.

The title of the section is "Means of Egress". R311.1 requires a means of egress from "all portions of the dwelling to the exterior of the dwelling…" R311.4 qualifies the charging language by stating that every habitable level including basements must either have an exterior exit door meeting the requirements of R311.2 or have a stair or ramp connecting that level to a level that has such a door. Note that it does not say "stairs" or "ramps" but "stair" or "ramp" (singular).

The text of the code does not support regulating stairs that are not a part of the "means of egress". This theory is apparently wide spread because many building officials are of the opinion that stairs used in landscaping are not regulated. Also, attempts to submit code changes to the ICC IRC Committee to give relief for stairs to attics and crawl spaces have been met with resistance from the Committee with the statement that they are already exempt. One can come to that conclusion only if you interpret the stair rules to apply to the means of egress and only one means of egress is required and that is only required from the dwelling, not attics, crawl spaces, and garages.

But if you take the position that the section only regulates those stairs that are part of the means of egress, stairways serving attics and crawl space and landscaping stairs would not be regulated but also stairs serving decks and the stairs commonly found serving as a path of travel from a dwelling to a garage would not be. In fact, R311.1 specifically prohibits a means of egress from traveling through a garage.

So there is confusion as to whether or not the code does regulate or intends to regulate certain stairs. This proposal makes it clear that all stairs are required to comply with the code unless specifically exempted. If this proposal is supported, stairs that are part of landscaping would be exempt unless they serve as a means of travel from a dwelling or accessory structure to grade. Stairs from a deck or from one level of a deck to another would be regulated. Stairs between a dwelling and garage would be regulated. Stairs serving an attic or crawl space would not be regulated. The current text already exempts stairs to crawl spaces by Section R311.4 but not directly. It exempts them because it does not list crawl spaces as a location where compliant stairs are required. But this also supports the possibility that the code does not regulate stairs serving a deck.

It is necessary to eliminate the confusion and inconsistency that exists in the enforcement of stair requirements that this language be approved. The proposal is reasonable because it puts into written format what is commonly accepted to be code language even if it cannot be supported by that text.

The following is for informational purposes only.

SECTION R311
MEANS OF EGRESS

R311.1 Means of egress. All *dwellings* shall be provided with a means of egress as provided in this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the *dwelling* to the exterior of the *dwelling* at the required egress door without requiring travel through a garage.

And,

R311.4 Vertical egress. Egress from habitable levels including habitable attics and *basements* not provided with an egress door in accordance with Section R311.2 shall be by a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

Cost Impact: None

R311.7-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that, in proposed Exception 3, "stairs that serve spaces for children used as play areas" is not defined. This is the means of egress section and stairs are included in the proposal in this section that are not part of the means of egress.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Submitted.

Commenter's Reason: The intent of this proposal was to make clear what stairs were regulated and provide exceptions for certain applications including structures used by children. However, the committee disapproved this proposal with the statement that the proposal addressed stairs that are not part of the means of egress and this was the means of egress section.

I disagree. It is necessary to consider the application of stair requirements to the variety of stairs found in a building regulated by the IRC. Regardless of whether or not you direct a building owner to build in a certain way, you need to be able to prosecute that violation and if the text does not track, you will fail in that prosecution and likely you won't even get it past your city attorney's desk.

The code requires that all ***dwellings*** (not accessory structures) shall be provided with a means of egress (R311.1). Are we to assume that stairs in accessory structures are not regulated? If one creates an art studio on the second floor of a detached garage, is the stair to the second floor not regulated? If you believe it is regulated, what code section do you cite?

The code requires that a means of egress be provided but specifically prohibits that path from traveling through a garage (R311.1). Are we to assume that the stairs commonly found serving as a path of travel between the house and garage is not regulated? If you believe it is regulated, what code section do you cite?

The code requires at least one egress door and provides specific requirements for that door (R311.2). A sliding door commonly used to provide access to a deck does not meet that requirement so a path through one of these doors to grade via the deck and stairs is not a compliant means of egress. Does that mean the stairs to the deck are not regulated? If you believe it is regulated, what code section do you cite?

The code requires vertical egress from a basement but only if there is not an egress door provided from the basement (R311.4). So, for homes with walkout basements and a compliant basement egress door, are we to assume the stair to the main floor is not regulated? If you believe it is regulated, what code section do you cite?

And if you are of the opinion that it is the intent of the code to regulate those stairs that are not part of the means of egress and that serve locations other than the dwelling, you are cornered into applying the stair requirements in all cases unless there are exceptions to those unique situations. Such is the case for stairs serving an attic or a child's playhouse.

Clearly there are differences of opinion over the regulation, or lack thereof, of certain stairs. As code officials, it is imperative that we have clear direction on how we enforce rules on stairs which are one of the most common elements in a home. If you believe you have a violation that needs to be corrected, you need to be able to prosecute that violation.

This proposal starts by requiring all stairs to comply with the code. This includes stairs serving buildings that are not dwellings. It includes stairs from decks to grade. This clears up the question regarding which stairs are regulated.

The proposal then provides specific exemptions for stairs serving attics and crawl spaces and those areas that only house equipment. It also provides an exception for structures or areas used as children's play areas. For example, a two story children's play house is not exempted from permits. Is it reasonable to require stairs intended to serve such a space to meet the geometry and headroom requirements found in the code? Of course not! New and remodeled homes sometimes have elevated areas in bonus rooms for children's play areas. Again, it is appropriate to provide some relief from the strict application of the code to these uses.

This proposal provides some long missing direction and closes some gaps in the path to requiring compliance with stair requirements.

RB129-13

Final Action: AS AM AMPC____ D

RB130-13
R311.7.1

Proposed Change as Submitted

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.1 Width. *Stairways* shall not be less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height and below the required headroom height. *Handrails* shall not project more than ~~4.5~~ 6.5 inches (~~114~~165 mm) on either side of the *stairway* and the minimum clear width of the *stairway* at and below the *handrail* height, including treads and landings, shall not be less than 31½ inches (787 mm) where a *handrail* is installed on one side and 27 inches (698 mm) where *handrails* are provided on both sides.

Exception: The width of spiral *stairways* shall be in accordance with Section R311.7.10.1.

Reason: The required continuous handrail often needs to project an additional 2 inches from the side of the stairway to maintain the required finger clearance when passing nosing projections at a floor, landing, or return flight. This would not diminish the required width and would provide needed finger clearance to avoid nosing projections into the stairway.

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

R311,7.1-RB-COOPER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proposal would not limit the increased projection to only the stated problem area.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise text as follows:

R311.7.1 Width. *Stairways* shall not be less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height and below the required headroom height. *Handrails* shall not project more than 4.5 inches (114mm) on either side of the *stairway* and the minimum clear width of the *stairway* at and below the *handrail* height, including treads and landings, shall not be less than 31½ inches (787 mm) where a *handrail* is installed on one side and 27 inches (698 mm) where *handrails* are provided on both sides.

Exceptions:

1. The width of spiral *stairways* shall be in accordance with Section R311.7.10.1.

2. Handrails may project an additional 2¼ inches (57 mm) into the stairway where passing nosing projections at a floor, landing or return flight in order to provide the 1½ inches (38 mm) space required in Section R311.7.7.2, provided the handrails do not project into the required stairway widths at and below the handrails.

Commenter's Reason: The committee felt that the original proposal did not limit the additional projection to the problem areas stated in the original reason statement. This modification clearly does so by removing the changes proposed to R311.7.1, Width, and adding Exception 2. The new exception not only limits when additional projection is allowed but provides for handrail continuity and finger clearance with no intrusion into the required width. The additional projection needed will not reduce the width currently required. This most accurately reflects the most common interpretation and enforced solution in the problem areas cited.

RB130-13

Final Action: AS AM AMPC____ D

RB133-13
R311.7.5.1

Proposed Change as Submitted

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.5.1 Risers. The maximum riser height shall be 7¾ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any *flight* of *stairs* shall not exceed the smallest by more than ⅜ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that ~~the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.~~ riser openings between treads located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the lower edge of the riser do not permit the passage of a 4 inch diameter (102 mm) sphere.

> ~~**Exception:** The opening between adjacent treads is not limited on stairs with total rise of 30 inches (762 mm) or less.~~

Reason: The exception allows unrestricted openings in risers if the stair has a 30" total rise. This is a flawed requirement. Flights stacked in a well could have a total rise of 30 inches and an exposure to a much greater fall distance to the next level or flight below. This change correctly identifies the hazard and the needed requirement applies the language found in section R312, Guard and window fall protection.

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

R311.7.5.1-RB-COOPER

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that it creates enforcement problems in that many different measurements might be required, and because the proposed language was confusing.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R311.7.5.1 Risers. The maximum riser height shall be 7¾ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any *flight* of *stairs* shall not exceed the smallest by more than ⅜ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided ~~that riser~~ the openings ~~between treads~~ located more than 30 inches (762 mm) measured vertically to the floor or grade below ~~at any point within 36 inches (914 mm) horizontally to the lower edge of the riser~~ do not permit the passage of a 4 inch diameter (102 mm) sphere.

Commenter's Reason: The current exception in the code allows unrestricted openings in risers if the stair has a 30" total rise. This is a flawed requirement. Flights stacked in a well could have a total rise of 30 inches and an exposure to a much greater fall distance to the next level or flight below. This change correctly identifies the hazard. The modification addresses the committee's concern by clearly stating the requirement in simple understandable terms and eliminates the need for the exception

RB133-13
Final Action: AS AM AMPC____ D

RB136-13
R311.7.8.2

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

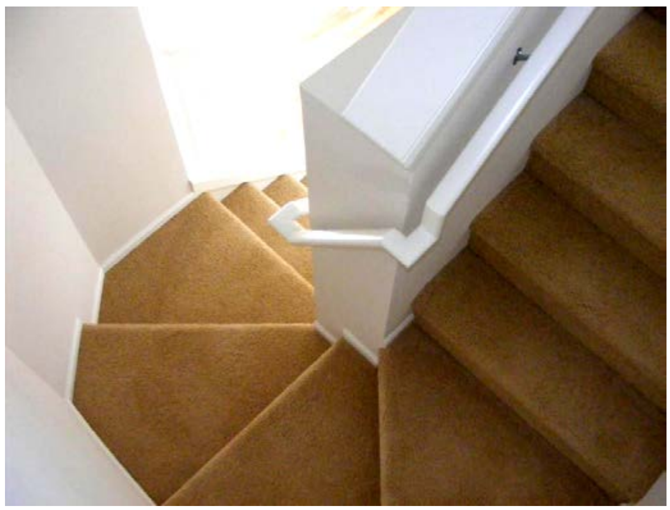
R311.7.8.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

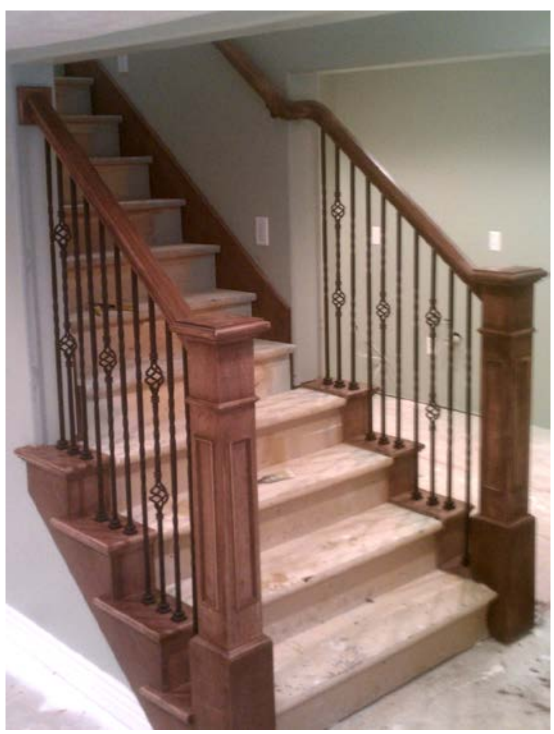
Exceptions:

1. Handrails shall be permitted to be interrupted ~~by a~~ newel posts ~~at the turn~~.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.
3. Handrails shall be permitted to be interrupted at the transition from a wall to a guard.
4. Handrails shall be permitted to be interrupted where a flight changes direction.

Reason: Handrails are required by the IRC to be continuous with two exceptions. The first allows the rail to be interrupted by a newel post "at a turn". The term "at a turn" can be interpreted in different ways. Does this mean a ninety degree turn, a 180 degree turn, or perhaps a 45 degree turn? Does it apply only when flights are interrupted by a landing or does it also apply to winder stairs? But let's face it. These rails are in dwellings, not public settings. These rails are often installed by homeowners who lack even simple joinery skills. The users of the stairs are familiar with their surroundings. The rails are not required for accessibility purposes. Yet they are required to meet the same standard that applies to high occupant load commercial applications. That is overkill.

If it is safe to remove one's hand when maneuvering around a newel post "at a turn", why is it not safe to do the same on a straight run of a stair, or when negotiating a turn on a winder stair, or when transitioning from a stair enclosed on both sides to open on both sides? Following are some attempts at compliance with current code





Does anyone really believe that the user of any of these stairs would maintain contact between their hand and the railing during the complete traverse of the stair? Likely not, because it requires twisting the wrist and hand in ways that are uncomfortable if not impossible.

Let's be realistic. For dwelling applications, it is reasonable to allow greater leeway in handrail designs. Following are some examples of railings designs that are no more hazardous than the ones deemed 100% compliant. The last example is commonly found by field inspectors on owner (and sometimes contractor) constructed deck stairs. Intermediate posts are necessary to stabilize the guard. But the post interrupts the handrail and results in a correction notice to install a continuous rail. This is usually met by complaints by the homeowner that no unsafe condition exists and many people would agree. Installing an additional railing on this type of stair "just to meet the code" smacks of over-regulation, generates complaints about the unsightly finished product, and adds unnecessary cost to the construction of the stair not to mention the ill will created between building departments and taxpaying homeowners.

It is time to add some reasonableness to the handrail requirements for dwellings. This proposal adds a number of changes. First, it allows the rail to be discontinued whenever a newel post occurs. It deletes the ambiguous term "at the turn" and allows the newel post be placed at any change of direction or at mid flight if desired. Either the interruption of a rail by a newel post is a hazard all of the time or none of the time. This proposal takes the position that a newel post poses no hazard. The second change allows the handrail to be discontinued where the stair makes a change from having walls on the side of the stair to having guards as is illustrated below. The basis for the argument is that creating a turn in the handrail that may cause the wrist to make a full ninety degree turn at this transition is not reasonable and that the average individual will take their hand off the rail anyway to make this transition. Furthermore, this situation, oft encountered when basements are finished, is difficult for most homeowners to overcome. The last change adds an exception allowing the handrail to be discontinued when the stair makes a change in direction as may occur with a winder stair. The following pictures illustrate some of those applications.

This proposal will not lessen the safety of stairs. In some cases it may enhance the safety by creating handrails that are more ergonomically useable. It will enable homeowners to comply with the rules and stay within their skill levels thus keeping costs reasonable.

Cost Impact: None

R311.7.8.2-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposed code change because they felt that stairs account for many falls and that a continuous rail is important, whether or not it is held continuously, to reduce the incidence of falls. No technical data was submitted to support the proposal.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David W. Cooper, Stair Manufacturing and Design Consulting, representing Stairway Manufacturers' Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R311.7.8.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

Exceptions:

1. Handrails shall be permitted to be interrupted by newel post~~s~~ at a turn or landing.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.
3. ~~Handrails shall be permitted to be interrupted at the transition from a wall to a guard.~~ Handrails serving as the tops of guards shall be permitted to be interrupted by a wall provided a continuing handrail is provided on the same side of the stair at the same height as measured above the line of the nosings.
4. ~~Handrails shall be permitted to be interrupted where a flight changes direction.~~

Commenter's Reason: We spoke against this proposal in Dallas due to the proponent's intent to allow intermediate newels in a straight run to interrupt the handrail allowing newels to interrupt the handrail at any point without restriction. However we mentioned the proposal clearly pointed to other needed provisions within the code.

Exception 1: Our modification proposes language from **IBC 1012.4 Continuity** Exception 1 which states "turn or landing" and is a simple way to eliminate the need for exception 4 that is working well within the code.

Exception 2: Remains unchanged.

Exception 3: This has been reworded to include concerns for a smooth transition assuring both rails are at the same height. As stated in the Dallas testimony of the proponent we have been using "S fittings" for 20 years and the fact is people do not follow them with their hand and they contribute nothing to safe use of stairways. It is time to realize this and provide a solution that can be easily and affordably provided.

RB136-13

Final Action: AS AM AMPC____ D

RB141-13
R311.8.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R311.8.1 Maximum slope. Ramps <u>serving the egress door required by section R311.2</u> shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3-percent slope). <u>All other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal (12.5-percent slope).</u>

Exception: Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight horizontal (12.5-percent slope).

Reason: When ramp slope requirements were changed a few years back, the reason stated was to enable persons with disabilities to stay in their homes. However, the scope of the proposal included all ramps, even those that could not be used by persons with disabilities. For example, dwelling additions to older homes sometimes have new basements at a deeper level and the owner wishes to make the transition by ramp. A 1:12 slope can sometimes be difficult to achieve and absorbs much more space than need be. Media rooms are often designed to have sloping floors with ramps serving the seating and again the 1:12 slope is problematic. This proposal gives some relief for those situations where accessibility may not be an issue. This also is consistent with section 1010.3 of the IBC which allows a 1:8 slope for pedestrian ramps not used as a means of egress.

IBC
SECTION 1010
RAMPS

1010.3 Slope. *Ramps* used as part of a *means of egress* shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other pedestrian *ramps* shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

Cost Impact: None

R311.8.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that a 1 in 12 ramp slope is a reasonable maximum when serving the egress door, but ramps serving other areas should have more flexible requirements.

Assembly Action: **Disapproved**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Disapproved and a public comment was submitted.

Public Comment:

Dominic Marinelli, representing United Spinal Association, requests Disapproval.

Commenter's Reason: United Spinal Association respectfully requests that RB-141-13(below)is disapproved.
The proposed added language to RB 311.8.1 "all other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal" would essentially create a large loophole given that only one egress door is required by R311.2, this language will permit

all ramps (other than the one ramp designated to serve the egress door), to have a maximum slope of 12.5%. As the intent of "Aging in Place" design features is to increase safety, accessibility, and independence for older adults in their own homes, permitting ramps to be constructed with a slope of 1 unit vertical to 8 units horizontal (12.5-percent slope) falls short of promoting accessibility, or aging in place features, where ramps are provided to areas of the home that would be utilized by the homeowner. Except for those areas where it is technically infeasible due to site constraints to provide a 1:12 maximum slope, United Spinal does not concur that all ramps (other than ramps serving egress doors) should be permitted to have a maximum slope of 1:8.

RB141 – 13 –
AS/DF
R311.8.1

Proponent: Rick Davidson, City of Maple Grove Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)
Revise as follows:

R311.8.1 Maximum slope. Ramps serving the egress door required by section R311.2 shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3- percent slope). All other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal (12.5-percent slope).

Exception: Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight horizontal (12.5-percent slope).

RB141-13
Final Action: AS AM AMPC____ D

RB144-13
R312.1.1, Chapter 44

Proposed Change as Submitted

Proponent: Mitch Markham, representing Ascend Restoration Services

Revise as follows:

R312.1.1 Where Required. *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard.*

> <u>**Exception:** Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1 affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.</u>

Add new standards to Chapter 44 as follows:

ANSI American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, NY 10036

<u>Z359.1-07 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components</u>

ASSE American Society of Sanitary Engineering
901 Canterbury, Suite A
Westlake, OH 44145

<u>Z359.1-2007 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components</u>

Reason: This proposal is intended to correlate with E108-12 which was approved at the 2012 FAH as a consent agenda item during the code Group A process. This proposal is needed so there is consistency and correlation between the ICC codes. E108-12 added clarity to IBC sections 1013.6 and 1013.7, IFC sections 1013.6 and 1013.7, and IMC section 304.11. The existing code provisions requiring the construction of guards do not adequately address the expanding list of equipment, assemblies, systems, devices and items that are now commonly being placed on roof tops and elevated walking surfaces that require routine maintenance. The current requirement needs clarification and a cost effective alternative to constructing a guard on a roof since a guard is a method of fall protection required at the edge of elevated surfaces where people will walk and will provide service to roof-located equipment and other systems or devices. The code change proposal adds clarity to the current code language by identifying items within the exception that are now typical placements on roofs and elevated walking surfaces. This expands the fall protection, life-safety provisions to a growing number of trades and service workers that are working on elevated surfaces. The proposal also provides an alternate method of compliance with the inclusion of an exception which allows for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1 which is the nationally recognized consensus general industry standard in use across the country. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics, US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second to only highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010, one third is from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries. In 2010 for nonfatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, equipment, fans, roof hatch openings, solar arrays, solar water heaters, photovoltaic panels, skylights, chimneys, attic vents, and ventilators, satellite dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above a lover level.

Cost Impact: The code change proposal will not increase the cost of construction because the current code provisions can be interpreted to have the intent to require guards at all elevated working level more than 30 inches above a floor, roof or grade. The inclusion of an exception provides a choice to the builder and homeowner to lower the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, [ANSI/ASSE Z359.1-2007] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R312.1.1-RB-MARKHAM

Committee Action Hearing Results

For staff analysis of the content of U.S. ANSI/ASSE Z359.1 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that anchorage devices are used primarily for protection of workers and there is no point in leaving them permanently in place. They are not particularly attractive. This proposal may be more appropriate if reworked as an exception to Section M1304.1.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ed Golden, representing Ascend Restoration Services requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R312.1.1 Where Required. *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard.*

> ~~**Exception:** Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1 affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.~~

Ml305.1 Appliance access for inspection service, repair and replacement. *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances,* or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance,* Installation of room heaters shall be permitted with at least an 18-inch (457 mm) working space. A platform shall not be required for room heaters.

> <u>**Exception:** Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.</u>

(Portions of proposal not shown to remain unchanged)

Commenter's reason: Members of the IRC Code Development Committee said during deliberation of this code change that section M1305.1is the preferred location for this proposed exception since M1305.1requires a level working space 30 inches by 30 inches. This exception is appropriate as it is a cost effective alternate to creating a safe working place when mechanical equipment is located on peaked roofs. This proposal is intended to correlate with E108-12 which was approved at the 2012 FAH as a consent agenda item during the code Group A process.This proposal is needed so there is consistency and correlation between the ICC codes. E108-12 added clarity to IBC sections 1013.6 and1013.7,IFC sections 1013.6 and 1013.7,and IMC section 304.11.The existing code provisions requiring the construction of guards do not adequately address the expanding list of equipment, assemblies, systems,devices and items that are now commonly being placed on roof tops and elevated walking surfaces that require routine maintenance.The current requirement needs clarification and a cost effective alternative to constructing a guard on a roof since a guard is a method of fall protection required at the edge of elevated surfaces where people will walk and will provide service to roof-located equipment and other systems or devices. The code change proposal adds clarity to the current code language by identifying items within the exception that are now typical placements on roofs and elevated walking surfaces. This expands the fall protection, life-safety provisions to a growing number of trades and service workers that are working on elevated surfaces. The proposal also provides an alternate method of compliance with the inclusion of an exception which allows for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1which is the nationally recognized consensus generalindustry standard in use across the country. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics,US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second to only highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010,one third is from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries.In 2010 for nonfatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, equipment, fans,roof hatch openings,solar arrays, solar water heaters, photovoltaic panels, skylights,chimneys,attic vents, and ventilators, satellite dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above a lover level.

RB144-13

Final Action: AS AM AMPC____ D

RB151-13
R313.2

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Revise as follows:

R313.2 One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in new *dwelling units* and new ~~one- and two-family~~ *dwellings*.

> **Exception:** An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing ~~buildings~~ *dwellings or dwelling units* that are not already provided with an automatic residential sprinkler system.

Reason: The 2009 IRC adopted fire sprinkler regulations that continue in the 2012 IRC. However upon implementation of the regulations it is apparent that an inconsistency appears in Section R313.2 when compared with Section R313.1. Section R313.1 in its exception exempts additions and alterations to townhouses that are not already protected with fire sprinklers. The exception does not exempt new townhouses added adjacent to existing townhouses from protection. Section R202 defines a townhouse as "**TOWNHOUSE.** A single-family *dwelling unit* constructed in a group…" and as a consequence R313.1 will require the new townhouse to be protected since it is a "single family dwelling unit".

Section R313.2 address a second configuration of dwelling that may be one dwelling or two attached dwelling units. It is not uncommon in more urban environments for a new dwelling unit to be added and attached to an existing dwelling and as a consequence the new dwelling unit should be protected as would a townhouse added adjacent to another townhouse dwelling unit.

The term building is not defined in the IRC and is not consistent with the heading of Section R313.2 and therefore the terms dwelling and dwelling unit are more appropriate.

Cost Impact: This code change will minimally increase the valuation of construction by less than 1 %.

R313.2-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it contained information that is already sufficiently addressed by the code and there is no point in repeating it.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Submitted.

Commenter's Reason: The original proposal is being resubmitted after a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change. We respectfully disagree with the committee that the proposed code change includes redundant language. We appreciate that code intends to limit impacts to existing buildings that are not protected with fire sprinklers and intends to regulate the impact to occupants in new dwellings (one or two attached dwelling units) as well as new townhouses (three or more attached townhouse units).

As published the IRC seems to require new fire sprinklers in townhouses that are separated from other townhouses with a common one hour wall. The IRC does not limit the total number of attached townhouses and does not require a lot line between townhouses. As a consequence a new dwelling unit that is attached or stand-alone can be added to an existing dwelling and be separated with a one-hour wall. It would appear that the hazards due to a new living unit whether a dwelling unit or townhouse or dwelling is the same however the latter is clearly required to include a fire sprinkler system. A dwelling unit addition, similar to a townhouse addition, normally includes limited alterations to the existing dwelling.

The 2009 IRC adopted fire sprinkler regulations that continue in the 2012 IRC. However upon implementation of the regulations it is apparent that an inconsistency appears in Section R313.2 when compared with Section R313.1.

- Section R313.1 in its exception exempts additions and alterations to townhouses that are not already protected with fire sprinklers. The exception does not exempt new townhouses added adjacent to existing townhouses from protection. Section R202 defines a townhouse as "**TOWNHOUSE.** A single-family *dwelling unit* constructed in a group…" and as a consequence R313.1 will require the new townhouse to be protected since it is a "single family dwelling unit".
- Section R313.2 address a second configuration of dwelling that may be one dwelling or two attached dwelling units. It is not uncommon in more urban environments for a new dwelling unit to be added and attached to an existing dwelling and as a consequence the new dwelling unit should be protected as would a townhouse added adjacent to another townhouse dwelling unit.

The term building is not defined in the IRC and is not consistent with the heading of Section R313.2 and therefore the terms dwelling and dwelling unit are more appropriate.

RB151-13

Final Action: AS AM AMPC____ D

RB157-13
R314.3.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

~~1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or doors, or the *addition* of a porch or deck, are exempt from the requirements of this section.~~
~~2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.~~
1. Addition, replacement or repair of windows or doors.
2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.
3. Additions of or repairs to porches, decks, or balconies.
4. Work involving detached accessory structures.
5. Installation of retaining walls or fences.
6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.
7. Installation, alteration or repairs of plumbing or mechanical systems within a dwelling unit.

Reason: It is necessary to more definitively identify those circumstances when smoke alarms are not required when alterations, repairs and additions occur because of confusion within the code enforcement community over the current language. The same revision is proposed for the CO alarm section.

For example, if smoke alarms need not be installed when a home is reroofed, are they required when someone builds a storage shed in their back yard? Current language does not seem to exempt such work.

Cost Impact: None

R314.3.1-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because the proponent requested disapproval so that it can be improved and brought back in the public comment period.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

<u>1. Work involving the exterior of *dwellings*.</u>
<u>2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.</u>
~~1. Addition, replacement or repair of windows or doors.~~
~~2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.~~
~~3. Additions of or repairs to porches, decks, or balconies.~~
~~4. Work involving detached accessory structures.~~
~~5. Installation of retaining walls or fences.~~
~~6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.~~
~~7. Installation, alteration or repairs of plumbing or mechanical systems within a dwelling unit.~~

Add new definition as follows:

<u>**Exterior of dwellings.** Exterior of dwellings shall mean the addition, replacement, or repair of windows or doors; exterior coverings regulated in Section R703; roof assemblies regulated in Chapter 9; additions, alterations or repairs to porches, decks, or balconies; and work involving accessory structures.</u>

Commenter's Reason: The first versions of the IRC exempted work involving the exterior of the dwelling from triggering installation of smoke alarms in existing dwellings. Because of confusion over what constituted "work involving the exterior of the dwelling", a phrase was added to the section in an attempt to give direction. The phrase was not mandatory language. It is what many call "commentary language". The phrase starts with "such as". This does not mean all inclusive. It is the same as "for example". The deletion of any of the items in the phrase does not change the application of the section. It may only make it less clear.

The modification re-inserts most of the language that was stricken from the original proposal except for the "such as" phrase. It also creates a definition for the term "exterior of dwellings". Because there is a companion code change for CO alarms, it seems more appropriate to have a definition that fits both sections than repeating the language in each with the possibility of later amendments creating inconsistencies.

The new definition eliminates the commentary language and in its place are references to specific areas of the code that are intended to apply. This clarity is necessary to reduce the confusion that exists with the current commentary language.

RB157-13

Final Action: AS AM AMPC____ D

RB159-13
R314.5 (New)

Proposed Change as Submitted

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association (TomHammerberg@afaa.org)

Add new text as follows:

R314.5. Residential Sprinkler Monitoring. Where a Residential Sprinkler System is installed, a sprinkler waterflow alarm-initiating device shall be permitted to be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Reason: This language is currently used in NFPA-72-2013, 29.7.7.7.3. The purpose is to provide notification to occupants of waterflow activation. If a sprinkler activates in another part of the dwelling unit, this provides earlier warning of the fire situation and will allow additional time to leave the premises. Since the time to escape has reduced significantly in recent years, this will improve fire safety for the occupants.

Cost Impact: Minimal

R314.5 (NEW)-RB-HAMMERBERG

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the code is not intended to describe what may, can or might be done, but rather what is required to be done.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas Norton, Norel Service Co., Inc, representing self, requests Approval as Submitted.

Commenter's Reason: This proposal seeks to permit the Authority Having Jurisdiction (AHJ) to allow the use of a water flow monitoring device, the installation of which is described in NFPA-72-2013 29.7.7.7.3.

RB159-13
Final Action: AS AM AMPC____ D

RB161-13
R315.3

Proposed Change as Submitted

Proponent: Jerry Anderson, City of Overland Park, Ks, representing self (jerry.anderson@opkansas.org)

Revise as follows:

R315.3 Where required in existing dwellings. Where work requiring a permit occurs in existing dwellings that have attached garages or in existing dwellings within which fuel fired appliances exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: The purpose of the code change is to exempt some minor work from triggering carbon monoxide detectors. The exceptions to the base requirement for installing carbon monoxide detectors in existing dwellings are exactly the same as found in section R314.3.1 for smoke detectors. This change will make the code consistent in its approach in providing early warning detection devices in dwellings. It is unreasonable require the installation of carbon monoxide detectors for any work that is done on an existing dwelling.

Cost Impact: No cost associated with this change

R315.3-RB-ANDERSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it appears to exempt some minor work from carbon monoxide requirements. This action is consistent with the requirements of R314.3.1 for smoke detectors.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Matt Archer, City of Lone Tree, representing Colorado Chapter ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R315.3 Where required in existing dwellings. Where work requiring a permit occurs in existing dwellings that have attached garages or in existing dwellings within which fuel fired appliances exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

~~1.~~ Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.

~~2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.~~

Commenter's Reason: Why would we exempt the installation of a carbon monoxide producing appliance from the alarm requirement that protects the occupants from their combustion products?

The exemption of minor work, especially on the outside of the house, is needed to limit the scope from triggering the requirements for a carbon monoxide alarm. To cut and paste the same exceptions from smoke alarms is good for consistency but does not make sense in this case.

RB161-13

Final Action: AS AM AMPC____ D

RB162-13
R315.3

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R315.3 Where required in existing dwellings. Where work requiring a *permit* occurs in an existing *dwelling~~s~~* that ~~have~~ has an attached garage~~s~~ or in an existing dwelling~~s~~ within which fuel fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

1. Addition, replacement or repair of windows or doors.
2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.
3. Additions of or repairs to porches, decks, or balconies.
4. Work involving detached accessory structures.
5. Installation of retaining walls or fences.
6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.
7. Installation, alteration, or repairs of plumbing, mechanical, or electrical systems not involving a fuel fired appliance.

Reason: Given the low number of deaths caused by CO poisoning compared to injuries and deaths caused by falls, fires, and other household accidents, the current rules regarding CO alarms are overly restrictive. Without exception, the code requires CO alarms be installed in a dwelling even when a permit is issued for a such mundane exterior work as retaining wall! This means homeowners must provide access to the interior of their homes to contractors and inspectors to install and inspect CO alarms (but not smoke alarms). Bluntly, this is ridiculous. The proposed revisions create a number of exceptions when CO alarms need not be installed. Unless some relief is given for exterior and other work that does not involve directly the ability to install CO alarms, permits will never get final inspections completed in a timely manner and building departments will be faced with a huge backlog of open permits.

Some folks will argue that the text says CO alarms are only required when work occurs "in" existing dwellings meaning exterior work is exempt. I might agree except the language used for CO alarms is the same used for smoke alarms and we seem to agree, based on exceptions in the code, that exterior work would trigger the smoke alarm requirements unless we have the exceptions. So if the text means one thing in one section, we conclude the same text means the same thing in another section.

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or

Cost Impact: None

R315.3-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because the proponent requested disapproval so that it can be improved and brought back in the public comment period.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R315.3 Where required in existing dwellings. Where work requiring a *permit* occurs in an existing *dwelling* that has an attached garage or in an existing dwellings within which fuel fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

~~1. Addition, replacement or repair of windows or doors.~~
~~2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.~~
~~3. Additions of or repairs to porches, decks, or balconies.~~
~~4. Work involving detached accessory structures.~~
~~5. Installation of retaining walls or fences.~~
~~6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.~~
~~7. Installation, alteration, or repairs of plumbing, mechanical, or electrical systems not involving a fuel fired appliance.~~
1. Work involving the exterior of *dwellings*.
2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Add new definition as follows:

Exterior of dwellings. Exterior of dwellings shall mean the addition, replacement, or repair of windows or doors; exterior coverings regulated in Section R703; roof assemblies regulated in Chapter 9; additions, alterations or repairs to porches, decks, or balconies; and work involving accessory structures.

Commenter's Reason: This proposal is identical to RB157 that addresses exemptions for installation of CO alarms in existing structures when work requiring a permit occurs. Assuming that other proposals survive the public comment period, there will be new text in the code exempting CO alarms when certain work occurs. This is an important step and needs to occur. What this proposal does is address the confusion that occurs when interpreting the meaning of "work involving the exterior of dwellings". As was pointed out in RB157, the code changed with the 2006 edition to include the phrase "such as….." This phrase provided a series of examples to aid in the interpretation of the section. The language is not mandatory but includes examples of work that are suggested would be exempt from triggering CO alarms in existing structures. This proposal seeks to build on the changes approved in Dallas by adding a definition for "exterior of dwellings" that inserts mandatory language rather than commentary language and better itemizes the kinds of work that applies. Even in this cycle, proposals have been submitted to delete terms from the "such as" phrase with the belief that such a change would impact the application of the rule. In fact all it would do is further confuse the issue. This change is needed to complete the need for clarity in applying this section of the code.

RB162-13
Final Action: AS AM AMPC____ D

RB163-13
R316.3

Proposed Change as Submitted

Proponent: Vytenis Babrauskas, PhD, Fire Science & Technology Inc., representing The American Institute of Architects, Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, Perkins + Will, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

~~**Exception**~~ **Exceptions:**

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic insulation shall not be subject to this requirement where installed with a thermal barrier in accordance with Section R316.4.

Reason: This proposal addresses a material performance requirement currently in the code which is not supported by available evidence from fire science research. Removal of the performance requirement as proposed would provide choice for manufacturers and consumers by allowing foam plastic insulation materials without flame retardants to be used in compliance with the code in a fire safe way. This would result in a healthier product at a lower cost.

The proposed change considers fire safety, public health, fire fighter and emergency responder safety, and energy efficiency. It is not a tradeoff among them, and improves them in many ways relevant to the current code requirements as described below and in the Substantiation Section.

For applications in which foam plastics are required to meet flame spread and smoke developed requirements of R316.3 and to be separated from interior spaces by an approved thermal barrier per R316.4, research and testing conducted over many years demonstrate the following:

It is the approved thermal barrier and the fireblocking required by the code that provide the fire safety related to foam plastic insulation, not its meeting the required flame spread and smoke developed ratings of R316.3. Even when foam plastic insulation meets the requirements of R316.3, if it is not protected by a thermal barrier it still poses an unacceptable level of fire hazard (Babrauskas et al., 2012).

In order to meet the flame spread and smoke developed requirements of R316.3, flame retardant chemicals are added to foam plastic insulations.

The two most common flame retardants used, hexabromocyclododecane (HBCD or HBCDD) and Tris (1-chloro-2-propyl) phosphate (TCPP), add potential risks throughout the product life cycle. These include environmental pollution, fire toxicity and possible adverse health effects for building occupants, fire service professionals, and the general public (Babrauskas et al., 2012). These chemicals are added only to meet flame spread and smoke developed requirements; they do not prevent foam plastics from burning.

Thermal barriers prevent temperature rise and adequately protect foam plastic insulation from igniting during a fire. Fire statistics show very few fires, no fire deaths and very few injuries attributable to fire started or spread by insulation within structural areas (Ahrens, 2011).

A precedent for a similar approach exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

In light of the available evidence, changing the code as proposed could:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase use of foam plastic insulations which are important for building energy efficiency by decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Substantiation: A thermal barrier meets the criteria of NFPA 275 by preventing the energy of a fire from reaching the foam. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003).

Due to protection by thermal barriers, fire statistics show that insulation very rarely starts or spreads home fires. Insulation within a structural area was the item first ignited in 2% of US home structure fires, resulting in 10 civilian deaths and 90 civilian injuries (0% and 1% of the death and injury totals for the whole US, respectively). Insulation within a structural area was the primary item contributing to flame spread in 2% of US home structure fires, resulting in 0 civilian deaths and 40 injuries (0% and 1% of the death and injury totals for the whole US, respectively) (Ahrens, 2011).

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003). When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

> "…persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms."
> and
> "Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment."
> (US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012).

Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From IRC Section R101.3 Intent:

> The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.
>
> From IRC Section R316.4 Thermal Barrier:
> Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

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Links to the following research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.greensciencepolicy.org/code-change-proposal/

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

R316.3 #1-RB-BABRAUSKAS

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposed code change because they felt that there needs to be more research into the health and safety issues related to foam plastics.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Eisenberg, Development Center for Appropriate Technology, representing Vytenis Babrauskas of Fire Science & Technology, Inc., Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exceptions:

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic insulation shall not be subject to this requirement where installed with a thermal barrier in accordance with Section R316.4 <u>on the interior side. Where foam plastic insulation is installed within 5 feet of a lot line it shall also be separated from the exterior of the building by an approved thermal barrier of not less than ½ inch (12.7 mm) gypsum wallboard or shall comply with Section R316.5 or Section R316.6. Where the exterior separation is required, foam plastic insulation shall comply with the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.</u>

Commenter's Reason: This public comment modification addresses a concern raised about the original proposal and now includes protection from the exterior for foam plastic insulation in close proximity to lot lines. Using the thermal barrier requirements of Section R316.4 for exterior protection provides consistency with fire safety requirements already in the code. This addresses increasing concerns about building-to-building fire spread. The fire separation distances in Section R302.1 Exterior Walls, for unlimited openings in non-rated walls is the basis for specifying five feet from the lot line as the distance triggering the exterior thermal barrier requirement.

This change would not require any changes in current practices or preclude the use of flame-retarded foam insulation, but would create the possibility for manufacturers to meet the rapidly rising demand for insulation without halogenated flame retardants. The increasing number of architectural and engineering design firms large and small, their clients, home owners, and green building and product certification programs concerned about the toxicity of flame retardant chemicals is driving market demand that is stymied by the current code provisions. This change would create the opportunity for more diversity in the market, encouraging the development and use of products that are safer for humans and the environment without sacrificing any fire safety.

The US Environmental Protection Agency (EPA) has already identified that halogenated flame retardants are chemicals of concern. Enabling the market to serve the demand for healthier, safer products is not dependent on EPA establishing the degree of human and ecological health hazards related to this family of chemicals, as documented in thousands of independent peer reviewed studies. Rather, the intent of the code mandates that it address public safety, health and general welfare and provide safety to firefighters and emergency responders.

Multiple lines of foam boards already exist, such as termite resistant and non-termite resistant foam. The labeling of rigid foam insulation to differentiate product lines is commonplace. Spray foam insulation can be differentiated either by labeling and reporting requirements for the components as is done now for some products or by development of color-coding.

A precedent exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

The rationale for this code change proposal is the existence of relatively new information about hazards not previously considered in addressing fire safety – namely that the solutions offered to reduce one aspect of fire hazard not create serious hazards elsewhere - such as human and ecological health risks. When such solutions do create other hazards, they are not redundancies representing "a belt and suspenders approach" as was stated in testimony in opposition. Further, redundancy is not a valid basis for minimum building code requirements.

In light of the available evidence, changing the code as proposed would:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase use of foam plastic insulations which are important for building energy efficiency by potentially decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Bibliography: Links to the following research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.org/bibliography/

RB163-13
Final Action: AS AM AMPC____ D

RB164-13
R316.3

Proposed Change as Submitted

Proponent: Vytenis Babrauskas, PhD, Fire Science & Technology Inc., representing The American Institute of Architects, Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, Perkins + Will, San Francisco Firefighters Cancer Prevention Foundation, the United States Green Building Council of California

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

~~Exception~~ <u>**Exceptions:**</u>

<u>1</u>**.** Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.

<u>2. Foam plastic insulation shall not be subject to this requirement when used in a wall, floor, foundation or roof assembly where the foam plastic insulation is separated from the interior of the building by a minimum 1-inch (25 mm) thickness of masonry or concrete.</u>

Reason: This proposal addresses a material performance requirement currently in the code which is not supported by available evidence from fire science research. Removal of the performance requirement as proposed would provide choice for manufacturers and consumers by allowing foam plastic insulation materials without flame retardants to be used in compliance with the code in a fire safe way. This would result in a healthier product at a lower cost.

The proposed change considers fire safety, public health, fire fighter and emergency responder safety, and energy efficiency. It is not a tradeoff among them, and improves them in many ways relevant to the current code requirements as described below and in the Substantiation Section.

For applications in which foam plastics are required to meet flame spread and smoke developed requirements of R316.3 and to be separated from interior spaces by an approved thermal barrier per R316.4, research and testing conducted over many years demonstrate the following:

It is the thermal barrier and the fireblocking required by the code that provide the fire safety related to foam plastic insulation, not its meeting the required flame spread and smoke developed ratings of R316.3. Even when foam plastic insulation meets the requirements of R316.3, if it is not protected by a thermal barrier it still poses an unacceptable level of fire hazard (Babrauskas et al., 2012).

In order to meet the flame spread and smoke developed requirements of R316.3, flame retardant chemicals are added to foam plastic insulations.

The two most common flame retardants used, hexabromocyclododecane (HBCD or HBCDD) and Tris (1-chloro-2-propyl) phosphate (TCPP), add potential risks throughout the product life cycle. These include environmental pollution, fire toxicity and possible adverse health effects for building occupants, fire service professionals, and the general public (Babrauskas et al., 2012). These chemicals are added only to meet flame spread and smoke developed requirements; they do not prevent foam plastics from burning.

Thermal barriers prevent temperature rise and adequately protect foam plastic insulation from igniting during a fire. Fire statistics show very few fires, no fire deaths and very few injuries attributable to fire started or spread by insulation within structural areas (Ahrens, 2011).

The Commentary for the 2012 IRC for Section R316.5.1 Masonry or concrete construction states: "No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and the interior of the building. The intent is to accept 1-inch (25 mm) of masonry or concrete as adequate protection against ignition, even though the concrete does not necessarily meet the performance criteria for thermal barriers."

This suggests that when foam plastic is separated from the interior of a building by minimum 1-inch (25mm) concrete or masonry, the flame spread and smoke developed requirements are not needed.

A precedent for a similar approach exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

In light of the available evidence, changing the code as proposed could:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase use of foam plastic insulations which are important for building energy efficiency by decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Substantiation: 1 inch (25 mm) or greater of concrete or masonry protects foam plastic from ignition in the same way as a thermal barrier which meets the criteria of NFPA 275- by preventing the energy of a fire from reaching the foam. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003). As stated in the Commentary, concrete or masonry also has these characteristics.

Due to protection by thermal barriers, fire statistics show that insulation very rarely starts or spreads home fires. Insulation within a structural area was the item first ignited in 2% of US home structure fires, resulting in 10 civilian deaths and 90 civilian injuries (0% and 1% of the death and injury totals for the whole US, respectively). Insulation within a structural area was the primary item contributing to flame spread in 2% of US home structure fires, resulting in 0 civilian deaths and 40 injuries (0% and 1% of the death and injury totals for the whole US, respectively) (Ahrens, 2011).

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003). When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

"…persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms."
and
"Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment."
(US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012).

Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From IRC Section 316.5.1 Commentary:

No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and the interior of the building. The intent is to accept 1-inch (25 mm) of masonry or concrete as adequate protection against ignition, even though the concrete does not necessarily meet the performance criteria for thermal barriers. This condition can arise when foam plastics are installed either within a wall or on one side of a wall. Some common examples are when foam plastics are installed:

- In the cavity of a hollow masonry wall,
- As the core of a concrete-faced panel,
- On the exterior face of a masonry wall and covered with an exterior finish, or
- Within the cores of hollow masonry units.
- Encapsulated within a minimum of 1 inch (25 mm) concrete or masonry wall, floor or roof system, as in insulated tilt-up or pour-in-place

Also, the flame spread rating of the foam plastic used must comply with the requirements of Section R316.3, but the smoke-developed rating of the foam plastic is not limited.

From IRC Section R101.3 Intent:

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

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

R316.3 #2-RB-BABRAUSKAS

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that multiple types of foam may be difficult to identify and the related fire safety issue is too large to risk, and because this action is consistent with prior committee action on RB163. We have recourse in our system for some of the types of issues raised on the floor, that being is civil action. Further research may be in order to explore whether something is happening.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Veena Singla, Green Science Policy Institute, representing Green Science Policy Institute, Vytenis Babrauskas of Fire Science & Technology, Inc., Cascadia Green Building Council, Development Center for Appropriate Technology, Hammond Fine Homes, International Living Future Institute, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exceptions:

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic board insulation shall not be subject to this requirement when used in <u>or below</u> a ~~wall,~~ floor~~,~~ <u>or</u> in a foundation ~~or roof assembly~~ where the rigid foam plastic insulation <u>has continuous separation</u> ~~is separated~~ from the interior of the building by a minimum 1-inch (25 mm) thickness of masonry or concrete~~.~~<u>, or is installed below grade in accordance with Section R403.3.</u>

Commenter's Reason: Where there is no fire safety hazard from a particular application of foam plastic insulation in a building, there is no justification for requiring flame spread and smoke development testing.

Flame spread and smoke development requirements lead to the incorporation of halogenated flame retardant chemicals in foam plastics. As these flame retardant chemicals present human health, fire fighter health and environmental concerns, it is desirable to identify applications for which their use can be reduced or eliminated while maintaining fire safety.

Installation below continuous concrete slabs, in floors where a minimum of 1" of concrete separates the foam from the interior of the building, or in foundations where either concrete or soil provides the required separation or protection, represent just such a use. Foam plastic insulation presents no appreciable fire hazard when used in these applications, as there is little to no potential for foam to burn. Thus, it is not necessary for foam plastics to meet flame spread and smoke development requirements in these applications.

This change would not require any changes in current practices or preclude the use of flame-retarded foam insulation, but would create the possibility for manufacturers to meet the rapidly rising demand for foam plastic insulation without halogenated flame retardants. The increasing number of architectural and engineering design firms large and small, their clients, home owners, and green building and product certification programs concerned about the toxicity of flame retardant chemicals is driving market demand that is stymied by the current code provisions. This change would create the opportunity for more diversity in the market, encouraging the development and use of products that are safer for humans and the environment without sacrificing any fire safety.

Multiple lines of building products and foam in particular already exist such as for the use of termite resistant and non-termite resistant foam. The labeling of rigid foam insulation to differentiate product lines is widespread.

This proposal and modification represent a more complete risk assessment than current code as it incorporates a more accurate reflection of fire safety risks along with risks to public health, and fire fighter and emergency responders. As was amply documented in the original proposal, halogenated flame retardants are hazardous or potentially hazardous chemicals which are known to be persistent organic pollutants and global contaminants. Proposed replacements of these chemicals are of the same general class of chemicals and thus are likely to present similar risks (Babrauskas et al., 2012). Thus, the use of these chemicals increases rather than decreases the overall risks from foam building insulation when used in these applications.

In light of the available evidence, changing the code as proposed would:

-reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
-better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
-increase the use of foam plastic insulations which are important for building energy efficiency by potentially decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Bibliography: Links to the following research reports, and other supporting documentation are available for viewing and download at: http://saferinsulation.org/bibliography/

Babrauskas, V., Lucas, D., Eisenberg, D., Singla, V., Dedeo, M., & Blum, A. (2012). Flame retardants in building insulation: a case for re-evaluating building codes. *Building Research & Information*, *40*(6), 738–755. doi:10.1080/09613218.2012.744533

RB164-13

Final Action: AS AM AMPC____ D

RB166-13

R316.4, R316.5.1, R316.5.2, R316.5.3, R316.5.7, R316.5.8

Proposed Change as Submitted

Proponent: Sean DeCrane, Battalion Chief, representing Cleveland Division of Fire, International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R316.4 Thermal barrier. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building and the exterior of the building when installed within ten feet of a property line by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

R316.5 Specific requirements. The following requirements shall apply to these uses of foam plastic unless specifically *approved* in accordance with Section R316.6 or by other sections of the code or the requirements of Sections R316.2 through R316.4 have been met.

R316.5.1 Masonry or concrete construction. The thermal barrier specified in Section R316.4 is not required in a masonry or concrete wall, floor or roof when the foam plastic insulation is separated from the interior of the building and the exterior of the building where installed within ten feet of a property line by a minimum 1-inch (25 mm) thickness of masonry or concrete.

R316.5.2 Roofing. The thermal barrier specified in Section R316.4 is not required when the foam plastic in a roof assembly or under a roof covering is installed in accordance with the code and the manufacturer's installation instructions and is separated from the interior of the building by tongue-and-groove wood planks or wood structural panel sheathing in accordance with Section R803, not less than 15/32 inch (11.9 mm) thick bonded with exterior glue and identified as Exposure 1, with edges supported by blocking or tongue-and-groove joints or an equivalent material. The smoke-developed index for roof applications shall not be limited. A thermal barrier meeting the requirements of R316.4 is required where foam plastic in a roof assembly is installed within 10 feet of a property line.

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required in attics where all of the following apply:

1. *Attic* access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. 11/2-inch-thick (38 mm) mineral fiber insulation;
   3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
   3.3. 3/8-inch (9.5 mm) particleboard;
   3.4. 1/4-inch (6.4 mm) hardboard;
   3.5. 3/8-inch (9.5 mm) gypsum board; or
   3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm);
   3.7. 11/2-inch-thick (38 mm) cellulose insulation.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. Crawlspace access is required by Section R408.4
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
   3.1. 11/2-inch-thick (38 mm) mineral fiber insulation;
   3.2. 1/4-inch-thick (6.4 mm) wood structural panels
   3.3. 3/8-inch (9.5 mm) particleboard;
   3.4. 1/4-inch (6.4 mm) hardboard;
   3.5. 3/8-inch (9.5 mm) gypsum board; or
   3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm). The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.5 Foam-filled exterior doors. Foam-filled exterior doors are exempt from the requirements of Sections R316.3 and R316.4.

R316.5.6 Foam-filled garage doors. Foam-filled garage doors in attached or detached garages are exempt from the requirements of Sections R316.3 and R316.4.

~~**R316.5.7 Foam backer board.** The thermal barrier specified in Section R316.4 is not required where siding backer board foam plastic insulation has a maximum thickness of 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/m2) when tested in accordance with NFPA 259 provided that:~~

1. ~~The foam plastic insulation is separated from the interior of the building by not less than 2 inches (51mm) of mineral fiber insulation;~~
2. ~~The foam plastic insulation is installed over existing *exterior wall* finish in conjunction with re-siding; or~~
3. ~~The foam plastic insulation has been tested in accordance with Section R316.6.~~

~~**R316.5.8 Re-siding.** The thermal barrier specified in Section R316.4 is not required where the foam plastic insulation is installed over existing *exterior wall* finish in conjunction with re-siding provided the foam plastic has a maximum thickness of 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/ m2) when tested in accordance with NFPA 259.~~

R316.5.9 Interior trim. The thermal barrier specified in Section R316.4 is not required for exposed foam plastic interior trim, provided all of the following are met:

1. The minimum density is 20 pounds per cubic foot (320 kg/m3).
2. The maximum thickness of the trim is 0.5 inch (12.7 mm) and the maximum width is 8 inches (204 mm).
3. The interior trim shall not constitute more than 10 percent of the aggregate wall and ceiling area of any room or space.
4. The flame spread index does not exceed 75 when tested per ASTM E 84 or UL 723. The smoke-developed index is not limited.

R316.5.10 Interior finish. Foam plastics shall be permitted as interior finish where *approved* in accordance with Section R316.6 Foam plastics that are used as interior finish shall also meet the flame spread index and smoke developed index requirements of Sections R302.9.1 and R302.9.2.

R316.5.11 Sill plates and headers. Foam plastic shall be permitted to be spray applied to a sill plate and header without the thermal barrier specified in Section R316.4 subject to all of the following:

1. The maximum thickness of the foam plastic shall be 31/4 inches (83 mm).
2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m3).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723.

R316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or kneewall, the provisions of Section R316.5.3 shall apply.

R316.5.13 Floors. The thermal barrier specified in Section R316.4 is not required to be installed on the walking surface of a structural floor system that contains foam plastic insulation when the foam plastic is covered by a minimum nominal 1/2-inch-thick (12.7 mm) wood structural panel or equivalent. The thermal barrier specified in Section R316.4 is required on the underside of the structural floor system that contains foam plastic insulation when the underside of the structural floor system is exposed to the interior of the building.

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

R316.7 Termite damage. The use of foam plastics in areas of “very heavy” termite infestation probability shall be in accordance with Section R318.4.

Reason: One of the main challenges the fire service is encountering in today’s environment is a pressing need of resources. Across the United States we are experiencing the loss of structures due to exterior exposures. These exposure fires can have devastating effects on an individual’s home and also place responding fire fighters at risk for rapidly spreading fires.

As the Fire Service encounters the economic realities of smaller budgets and increased demand we are continuously being asked to do more with less. Responding units many times must address growing exposure fires due to the narrow property lines.

In today’s environment there is a growing trend to promote energy conservation. While this is widely supported, and a worthy goal, we must also factor in a level of safety. As with most things in life there must be a balance between efficiency and safety.

A search of the Vinyl Siding Institute’s website www.vinylsiding.org produces a great deal of information on the R-Values and potential cost benefits of increasing the use of foam backing on the vinyl siding. There is little information on the fire performance of these products. It is true many of the foam insulation products are given a Class A flame spread rating in an ASTM E 84 Test Standard. That is one of the problems, the E 84 is a horizontal test standard yet we install the foam insulation products vertically drastically impacting the true fire performance in the field. In fact to demonstrate the safety of vinyl siding it is compared to the performance of vinyl sheathed wiring: *“Additionally, vinyl meets the stringent National Fire Protection Association (NFPA) requirements. The NFPA Electrical Code recognizes the strong fire-safe characteristics of vinyl through its approved use as a residential wiring insulator. Millions of homes have been wired using safe vinyl-sheathed electrical systems for decades.*[1]

They further state; *Safe homes use fire-safe claddings, which include vinyl siding. Why does vinyl siding provide good fire performance? It is composed mainly of polyvinyl chloride, more commonly known as vinyl or PVC. Due to its chlorine base, vinyl siding does not ignite quickly and is inherently flame-retardant. Read on to discover more facts on vinyl siding’s fire performance…..All organic materials (that is, anything containing carbon) will ignite. But the higher the temperature a material has to reach before it flames, the safer it is. PVC won’t ignite, even from another flame, until it reaches about 730°F (387°C) and won’t self-ignite until about 850°F (454°C).* [1] Fire doesn’t propagate until 750°F, what is the temperature of flame? Again, our issue isn’t necessarily the siding it is the foam backing behind it as the siding when exposed to high temperatures will begin to melt and fall away exposing the increasing amounts of foam insulation.

Current tests are being conducted by UL and NIST and additional testimony and data will be presented during the code development process.

1. 2005 National Electrical Code, NFPA 70, Article 334.

Cost Impact: Will not increase the cost of construction

R316.4-RB-DECRANE

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that it was confusing and imposed undue restrictions on the use of foam plastics without technical support. It also may be in conflict with energy provisions and the cost related information appears to be inaccurate. The difference in offset requirements could substantially increase costs. The 10 foot distance requirement was not substantiated.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Sean DeCrane, representing Cleveland Division of Fire / International Association of Fire Fighters, requests Approval as Submitted.

Commenter's Reason: Tests are continuing at Underwriters Laboratories, with test results demonstrating the performance time of a combustible exterior wall to be very concerning to the fire service. Subjecting combustible wall siding to a 100 kilowatt fire quickly and easily penetrated the vinyl siding exposing the foam insulation behind the siding. This is leading to rapid fire travel up the side of a structure into the attic area.

This code change proposal is attempting to address the concern for the rapidly transferring exposure fire. Recently outside of Myrtle Beach over 100 apartments were lost to a brush fire that suddenly travelled from building to building. The propagation of flame from one structure to another is a challenge to the fire service. We have experienced staffing reductions in many areas of the country. This is causing Incident Commanders to deploy initial arriving companies into a position of exposure fire protection or not being able to provide exposure protection which leads to further damage of the neighboring structures.

This author is interested in identifying various options to protection. We are aware of energy conservation concerns but believe there has to be a balance between energy conservation and fire safety performance. Vinyl siding is engineered to melt and fall away when exposed to temperatures exceeding 750ºF. Again the concern is the unprotected foam, which in many cases is a petroleum based foam insulation product. If we don't want to require the performance of the exterior wall covering then we must provide the protection of distance.

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Public Comment 2:

Steve Orlowski, representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: We agree with the committee's action to disapprove the proposed code change based on the lack of technical justification requiring all walls with foam insulation to be protected by a thermal barrier when the exterior wall is within ten feet of the property line. There have been studies conducted by NIST that prove the current requirements for fire separation are more than adequate to deal with the concerns raised by the proponent. These studies conducted by NIST showed that when dwellings are less than five feet from the point used for fire separation distance and are protected by a one-hour fire resistant rating, the potential of a fire from one dwelling to develop enough heat to ignite the adjacent structure is significantly reduced. The study further showed that the one-hour fire-resistant rating between the structures significantly delayed flame spread between dwellings and provide the fire service with a considerable amount of valuable time to respond and suppress the fire, further reducing the ability for an exposure fire. In addition, the proponent has provided no indication where the arbitrary ten foot requirement came from or why a wall within ten feet of a property line is a hazard, considering the face of the wall containing the product could face an alley or street.

RB166-13

Final Action: AS AM AMPC____ D

RB167-13
R316.4

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council (dpitts@awc.org)

Revise as follows:

R316.4 Thermal barrier. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard, <u>23/32 inch (18.2 mm) wood structural panel</u> or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

Reason: Wood structural panels are permitted prescriptively as a thermal barrier in various thicknesses in subsections of R316.5. R316.5.2 allows 15/32" WSP as a thermal barrier in roofs, R316.5.3 allows ¼" WSP for attics, and R316.5.4 allows ¼" WSP for crawlspaces. This proposal would prescriptively allow a thicker WSP to be used as a thermal barrier in other applications that might arise.

Prior to a recent change in NFPA 275 that essentially requires a Class A flame spread rating for materials used as thermal barriers, 23/32" WSP complied with NFPA 275. This proposal prescriptively recognizes a history of satisfactory service as a thermal barrier, even for thinner panels, although the material isn't a Class A material.

Cost Impact: No increase in cost of construction.

R316.4-RB-PITTS

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that such panels have been used for years between foam and the interior of the house and have served quite well. If the panels burn through, the problem will be greater than those caused by the foam.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler (GBH International), requests Disapproval.

Commenter's Reason: Foam plastic insulation is required to be separated from the interior of a building to offer protection from fire exposure, because it is well known that a severe fire can result if foam plastic insulation is exposed to a fire and ignites. Therefore, foam plastic insulation is required to be protected from fire (for 15 minutes) by a thermal barrier. Traditionally such protection has been provided by "an approved thermal barrier of minimum ½ inch gypsum wallboard or an approved finish material equivalent to a thermal barrier material" as shown below, for the 2006 code.

> ***R316.4 Thermal barrier****. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an approved thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or an approved finish material equivalent to a thermal barrier material that will limit the average temperature rise of the unexposed surface to no more than 250°F (139°C) after 15 minutes of fire exposure complying with the ASTM E119 or UL 263 standard time temperature curve. The thermal barrier shall be installed in such a manner that it will remain in place for 15 minutes based on NFPA 286 with the acceptance criteria of Section R302.9.4, FM 4880, UL 1040 or UL 1715.*

The verbiage about “equivalent” was replaced by a reference to a material that complies with NFPA 275. NFPA 275 requires that, in order for a material to be listed as a thermal barrier, it must be tested in a room corner test (such as NFPA 286), over the foam plastic insulation intended for use behind the thermal barrier, and that the system complies with the following:

(1) No flashover for 15 minutes
(2) A peak heat release rate of less than 800 kW
(3) A total smoke release of less than 1,000 m^2

When a wood structural panel is tested in the NFPA 286 fire test the panel reaches flashover, irrespective of whether the foam plastic is behind the panel or not. That means that the wood structural panel is not providing the necessary protection that thermal barriers are intended to provide.

This proposal adds prescriptively a 23/32nd inch wood structural panel instead of a thermal barrier protecting the interior from the exposed foam plastic. That is not a safe approach as the fire safety is too low. We have had numerous examples of fires resulting from burning foam plastic insulation to go back to such a system. If the wood panels burn through (and it is known that they do that in just a very few minutes, even without the combustible foam behind them) the fire problem is exacerbated because we now have burning foam plastic. On the other hand, if a thermal barrier is in place, the thermal barrier will protect the interior of the building from the burning foam for a full 15 minutes.

The proposal reason incorrectly states that wood structural panels are permitted as a thermal barrier in sections of 316.5 but the referenced sections talk about “ignition barriers” and not about “thermal barriers”, and that is a very different concept. R316.5.3 permits the use of various wood products as ignition barriers (with added protections) for attics. Similarly, R316.5.4 permits the use of various wood products as ignition barriers for crawl spaces, again with added protections. Even R316.5.2, where 15/32nd inch wood structural panel sheathing is allowed instead of a thermal barrier for protection of roof assemblies requires added protections. Moreover, none of these applications would allow plain wood structural panels to be the only protection between foam plastic insulation and the interior of a building, without size limitations.

The “ignition barriers” discussed above (and mentioned by the submitter) all address unoccupiable spaces, while the thermal barriers which would be changed by this proposal address occupied spaces. If this proposal is not disapproved, the entire interior of a residential building can be lined with wood structural panels and foam plastic insulation, without protection from fire.

RB167-13

Final Action: AS AM AMPC____ D

RB174-13
R316.6

Proposed Change as Submitted

Proponent: Tony Crimi, A.C. Consulting Solutions, Inc., representing North American Insulation Manufacturers Association (NAIMA) (tcrimi@sympatico.ca)

Revise as follows:

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. <u>Foam plastics that are used as an interior finish on the basis of special tests shall also conform to the smoke-developed requirements of Section R302.9.4 or Section R316.3.</u> Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Reason: At a minimum, the provision for special approvals for foamed plastics, which waives other requirements of the IRC for foamed plastics needs to provide a comparable level of performance and safety to the existing provisions. The exception for foamed plastics in R316.6 does not adequately cover smoke developed performance of foamed plastics. Current requirements for glass fiber, mineral fiber, cellulose and reflective plastic core insulation all require both flame spread and smoke development requirements either based on ASTM E84 or UL 723 or R302.10 Alternative methods are acceptable for use, however, their performance level needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material. This proposal makes the section more consistent with the parallel provision in the IBC.

Justification: For all other thermal and sound insulating materials within the IRC, including non-combustible insulation materials, the minimum performance level for materials permitted to be used includes at least some requirements for both flame spread (fire growth) and smoke production. These requirements are primarily based on either ASTM E84 testing or alternative methods such as NFPA 286 and CAN/ULC-S102.2. However, in the case of foamed plastics, of the four alternative test methods permitted by 2603.9, only NFPA 286 contains any limits on smoke developed for any foamed plastics by virtue of the inclusion of a reference to section R302.9.4.

Room corner tests such as FM 4880, UL 1040, NFPA 286 or UL 1715 do evaluate fire growth and flashover. However, with the exception of the criteria for NFPA 286 in R302.9.4, the pass/fail criteria proposed for the room corner tests in the proposed acceptance criteria do not include quantitative evaluation of smoke density. Criteria for fire and smoke performance of building materials are based as much on issues arising from smoke production from burning materials, and smoke migration within the occupied spaces. It is not reasonable to provide an exception to the basic ASTM E84 flame spread and smoked developed requirements which apply to all other types of insulations, even non-combustible insulations, for foamed plastics based on room corner tests unless the limits on smoke production are applied to all of the room corner tests.

There are numerous reported instances of the hazards associated with smoke production from building materials. One is the tragic fire at the Greenwood Health Center in Hartford, CT on Feb 26 2003. The New York Times quoted Chief Charles A. Teale of the Hartford Fire Department as stating that “Most of the 10 residents killed, ranging in ages from 27 to 76, died of smoke inhalation”. The same article further goes on to quote officials as saying: “The nursing home itself suffered little damage, though, and the fire was put out in about 15 minutes. Most of the residents were then led back inside, and by midday, 84 of the 148 residents remained at the center”.

It is reasonable to allow alternative methods of testing materials to determine their acceptability for use, however, their performance criteria needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material.

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

R316.6-RB-CRIMI.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this proposed code change because they felt that it duplicated other code requirements and because the proponent needs to clarify what the phrase “special testing” refers to.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Tony Crimi, A.C. Consulting Solutions Inc., representing North American Insulation Manufacturers Association (NAIMA), requests Approval as Submitted.

Commenter’s Reason: This proposal aims to ensure that smoke development requirements are not inadvertently omitted for foamed plastics complying with R316.6.

The IRC has specific requirements for flame spread ratings and smoke developed index for Insulation materials. It begins in R302.10, which requires Insulation materials, including facings, to have a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84 or UL 723. This section provides an exception for foamed plastics complying with R316.

R316.3 still requires foam plastic insulation more than 4 inches (102 mm) thick to have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is also *approved* in accordance with Section R316.6 using the thickness and density intended for use. This exception does not waive the smoke developed requirements of R302.10 or R316.3.

The language in R316.3 begins by stating "Unless otherwise allowed in Section R316.5 or R316.6....". R316.5.10 for interior finish is very clear that foam plastics permitted as interior finish where *approved* in accordance with Section R316.6 shall also meet the flame spread index and smoke developed index requirements of Sections R302.9.1 and R302.9.2.

However, when a Code user goes directly from the Exceptions in R302.10 and R316.3 to R316.6, foam plastics used in all other applications identified in R302.10 and R316.3 such as all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction, or foam plastic insulation, do not clearly require the smoke developed ratings. The requirement to comply with smoke developed ratings is unclear, because, with the exception of NFPA 286 and the criteria in R302.9.4, the room corner tests permitted to be used (such as FM 4880, UL 1040, and UL 1715) do not include quantitative evaluation of smoke density. Also, only the UL 723 and ASTM E84 can provide the "smoke developed" ratings required in the IRC.

At a minimum, the provision for special approvals for foamed plastics, which waives other requirements of the IRC for foamed plastics, needs to provide a comparable level of performance and safety to the existing provisions. The exception for foamed plastics in R316.6 does not adequately cover smoke developed performance of foamed plastics. Current requirements for glass fiber, mineral fiber, cellulose and reflective plastic core insulation all require both flame spread and smoke development requirements either based on ASTM E84 or UL 723 or R302.10 Alternative methods are acceptable for use, however, their performance level needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material. This proposal makes the section more consistent with the parallel provision in the IBC.

Public Comment 2:

Jesse J. Beitel, Hughes Associates, Inc. representing The Extruded Polystyrene Foam Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Revise text as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in Section R316.5 ~~or R316.6~~, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smokedeveloped index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

> **Exception:** Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is approved in accordance with Section R316.6 using the thickness and density intended for use.

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections ~~R316.3~~ R316.4 through R316.5 shall be specifically *approved* on the basis of one of the following approved tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM 4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Commenter's Reason: This comment will require that foam plastic insulations and foam plastic cores evaluated under Section R316.6 also meet the flame spread and smoke-developed requirements of Section R316.3. This requirement will bring the IRC into conformity with the requirements of the IBC.

Public Comment 3:

Marcelo M. Hirschler (GBH International), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as an interior finish on the basis of a fire test that does not assess smoke development shall also demonstrate adequate smoke development requirements such as, but not limited to, compliance with the requirements of Section R302.9.4 ~~shall also conform to the smoke developed requirements of Section R302.9.4 or Section R316.3~~. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Commenter's Reason: This section requires that foam plastic that is not covered by a thermal barrier needs to meet requirements for flame spread (or heat release) and for smoke release. Moreover, this section also allows the use of other *approved* fire tests "related to actual end-use configurations". However, the section is not explicit that smoke development needs to be assessed in every "special approval" case. The section specifically mentions 4 full scale fire tests, but only 2 of the 4, namely NFPA 286 and UL 1715, require smoke measurements. Neither FM 4880 nor UL 1040 requires smoke measurements. Section R302.9.4 contains the requirements of smoke development for testing to NFPA 286. This proposal would allow the code official the leeway to decide what is an appropriate fire test for the foam plastics, while ensuring that smoke development is adequately assessed. When large scale fire tests are conducted, for example to FM 4880 or UL 1040, information on smoke is always available in the test report even if it may be qualitative or visual. That qualitative (or visual) information is likely to be sufficient for a code official to decide whether the material exhibits adequate smoke development.

RB174-13

Final Action: AS AM AMPC____ D

RB177-13
R320.1, R320.1.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

R320.1 Scope. Where there are four or more *dwelling* units ~~or *sleeping units*~~ in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

<u>**R320.1.1 Guest rooms**. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the *International Building Code* for Group R-3. For the purpose of applying the requirements of IBC chapter 11, *guestrooms* shall be considered sleeping units.</u>

<u>**Exception:** Lodging houses.</u>

Reason: Residential and institutional occupancies with 6 or more residents are within the scope of the IBC only and cannot be constructed under the IRC. This is based on both the scope of the IRC and IBC. Scoping provisions of the IRC and IBC, and code provisions within the IBC permit some residential and institutional occupancies with 5 or fewer occupants to be constructed in accordance with the IRC as an alternative to compliance with the IBC. The IBC occupancies that allow use of the IRC for five or fewer guests are: Group R-3 lodging houses (see G40-13), lodging houses are also in the scope of the IRC in section 101.2 #2; section 308.3.1 for Group I-1 and 308.4.1 for Group I-2.

Per the 2010 ADA Standard for Accessible Design and the IBC 1103.2.11 owner occupied lodging houses with 5 or fewer guests are not required to be accessible. So compliance with the IRC works for this condition without causing any conflicts with the IBC. If the lodging house is not owner occupied or accommodates more than 5 guests the building is outside of the scope of the IRC and accessibility is addressed since the building will be constructed per the IBC.

The issue addressed by this code change is how to handle 2012 IBC Sections 308.3.1 for I-1 and 308.4.1 for I-2. These sections classify the building as Group R-3 or allow use of the IRC for these institutional uses that have 5 or fewer care recipients. If it is classified as Group R-3 then IBC section 1107.6.3 provides requirements for accessibility of the building. Clearly the intent of Section 1107.6.3 is that if you have 4 or 5 care recipients the "sleeping units" must be Type B (subject to Section 1107.7 exceptions). The problem is that IRC structures by scope and definition do not have sleeping units:

> **R101.2 Scope.** The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, *alteration,* movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures.*
>
> **DWELLING.** Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

Adding the IBC definition of sleeping units to the IRC does not work because IBC sleeping units are not part of a dwelling unit. The current IBC definition of sleeping units states that "Such rooms and spaces that are also part of a dwelling unit are not sleeping units". Having a building constructed under the IRC that is not a dwelling unit, but a building with multiple sleeping units, is outside of the scope of the IRC.

Any of the Group I uses for 5 and under that are built to the IRC should have the same accessibility requirements as a Group R-3 constructed building. The IRC does not have sleeping units. Under the IRC such facilities are a dwelling unit with guest rooms. While the IRC contains a definition for guestroom, it is not clear on how the guestrooms should be counted for accessibility. Since the resident rooms are not sleeping units but guest rooms the current Section R320.1 does not require accessibility per Chapter 11 of the IBC for any IRC structures that have multiple guest rooms in one dwelling unit. The solution proposed here is to delete sleeping units from Section R320.1 to remove the confusion about the scope of sleeping units in the IRC and to add new Section R320.1.1 to address guestrooms. The statement that guestrooms shall be considered sleeping units for the purpose of applying IBC Chapter 11 is necessary because we cannot change the IBC language until the 2018 cycle. We plan to propose a more coordinated change for both the IBC and IRC to address this issue in the 2018 cycle. The exception for lodging houses is to maintain the exemption from accessibility requirements for lodging houses consistent with IBC Section 1103.2.11.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this code change proposal because they felt that it provided a useful pointer to the related provisions in the International Building Code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee and Steve Orlowski, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R320.1 Scope. Where there are four or more *dwelling* units in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

R320.1.1 Guest rooms. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the *International Building Code* for Group R-3. For the purpose of applying the requirements of IBC chapter 11, *guestrooms* shall be considered sleeping units.

> **Exception:** ~~Lodging houses.~~ <u>Owner-occupied lodging houses with five or fewer guestrooms constructed in accordance with the *International Residential Code* are not required to be accessible.</u>

Commenter's Reason: The original proposed language deals with townhouses and group homes/hotels separately. Unfortunately, with the passage of both RB177 and RB178, the result will be confusing. The proposed modification to the exception would do 3 things:

1. Include the more specific language for the exception in RB178
2. More closely align with IRC scoped for lodging houses (i.e., bed-n-breakfast), and
3. Would be consistent with the exemption IBC Group R-1 in Section 1103.2.11 (i.e., bed-n-breakfast).

The IRC scope now includes some small group homes, live/work units and bed-n-breakfast hotels. The 2012 IRC scope, Section 101.2, Exception 2, is limited to "Owner-occupied lodging houses with five or fewer guestrooms shall be permitted to be constructed in accordance with the IRC when equipped with a fire sprinkler system in accordance with Section P2904."

Guestrooms and lodging houses are defined in the IRC (see definitions below). Sleeping units are not defined in the IRC, but they are relevant to Fair Housing/Type B unit requirements.

Guestroom – Any room or rooms used or intended to be used by one or more guests for living or sleeping purposes.

Lodging House – A one-family dwelling, where one or more occupants are primarily permanent in nature, and rent is paid for guest rooms.

While some may not prefer to define sleeping rooms in group homes as guestrooms, with the current language, that is the best fit. The CTC will be looking at this next cycle to try and coordinate accessibility requirements and language between the IBC and IRC. They will also look at accessibility for live/work units.

This solution is supported by the proponents of both proposals, RB177 and RB178.

RB177-13

Final Action: AS AM AMPC____ D

RB178-13
R320.1

<u>Proposed Change as Submitted</u>

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB) (sorlowski@nahb.org)

Add new text as follows:

R320.1 Scope. Where there are four or more *dwelling* units or sleeping units in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

> <u>**Exception:** Owner-occupied lodging houses with five or fewer guestrooms or sleeping units constructed in accordance with the *International Residential Code* are not required to be accessible.</u>

Reason: Based on the action taken during the Group A Hearings, Lodging houses are now referenced in the IBC. It was noted during the hearings, that lodging houses with five or fewer guest rooms or sleeping units are not required to be accessible under the 2010 ADA Guidelines. This proposal simply clarifies that lodging houses are not subject to the provisions of Chapter 11 of the IBC if they contain five or fewer guest rooms or sleeping units.

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

R320.1-RB-ORLOWSKI

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Modified**

Modify proposal as follows:

R320.1 Scope. Where there are four or more *dwelling* units or ~~sleeping units~~ <u>guestrooms</u> in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

> **Exception:** Owner-occupied lodging houses with five or fewer guestrooms ~~or sleeping units~~ constructed in accordance with the *International Residential Code* are not required to be accessible.

Committee Reason: The committee approved this code change proposal because it clarifies when related provisions in the International Building Code are applicable. The committee modified this proposed code change because the term "sleeping units" is not used in the International Residential Code.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee and Steve Orlowski, representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: RB177 and RB178 were developed as options to address accessibility concerns with the scoping to the IRC for small bed-n-breakfast hotels. With both passing, the end result would add confusion in the code. For coordination/clarification, the public comment for RB 177 should be approved, and this change needs to be disapproved. This solution is supported by the proponents of both proposals.

RB178-13

Final Action: AS AM AMPC____ D

RB180-13

R322.1, R322.1.6, R322.1.8, R322.1.9, R322.2, R322.2.1, R322.3, R322.3.2, R322.3.3, R322.3.4, and R106.1.3

Proposed Change as Submitted

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

Revise as follows:

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones and Coastal A Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1.6 Protection of mechanical and electrical systems. Electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall be located at or above the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones). If replaced as part of a substantial improvement, electrical systems, equipment and components; heating, ventilation, air conditioning and plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

> **Exception:** Locating electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment is permitted below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones) provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided they conform to the provisions of the electrical part of this code for wet locations.

R322.1.8 Flood-resistant materials. Building materials used below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones) shall comply with the following:

1. All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use or be the decay–resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWPA U1.
2. Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA-TB-2.

R322.1.9 Manufactured homes. New or replacement manufactured homes shall be elevated in accordance with Section R322.2 (flood hazard areas including A Zones) or Section R322.3 in coastal high-hazard areas (V Zones and Coastal A Zones). The anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured homes to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.2 Flood hazard areas (including A Zones). All areas that have been determined to be prone to flooding but not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1.5 feet and 3 feet or otherwise designated by the jurisdiction shall be designated as Coastal A Zones and are subject to the requirements in Section R322.3. All buildings and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R322.2.1 through R322.2.3.

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas not designated as Coastal A Zones shall have the lowest floors elevated to or above the design flood elevation.
~~2. Buildings and structures in flood hazard areas designated as Coastal A Zones shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or to the design flood elevation, whichever is higher.~~
2.~~3~~ In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM, or at least 2 feet (610 mm) if a depth number is not specified.
3.~~4~~ Basement floors that are below grade on all sides shall be elevated to or above the design flood elevation.

Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R322.2.2.

R322.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated). Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave–induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1.5 feet and 3 feet or otherwise designated by the jurisdiction shall be designated as Coastal A Zones. All buildings and structures constructed in whole or in part in coastal high-hazard areas and in Coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.6.

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is:
1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees from the direction of approach, or
1.2 Located at the base flood elevation plus one foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees from the direction of approach.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings, and for support of parking slabs, pool decks, patios, and walkways.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

R322.3.3 Foundations. All buildings and structures erected in coastal high-hazard areas and Coastal A Zones, shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave–velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24. Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.

> **Exception:** In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion, and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

R322.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (479 Pa) and no more than 20 pounds per square foot (958 Pa); or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the construction documents shall include documentation prepared and sealed by a registered design professional that:
   4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the design flood.
   4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.
5. In Coastal A Zones walls shall be provided with flood openings that meet the criteria of Section 322.2.2.

Add new text as follows:

R106.1.3 Information for construction in flood hazard areas. For buildings and structures located in whole or in part in flood hazard areas as established by Table R301.2(1), construction documents shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate;
2. The elevation of the proposed lowest floor, including basement; in areas of shallow flooding (AO zones), the height of the proposed lowest floor, including basement, above the highest adjacent finished grade; and

3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone) <u>and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2(1) or otherwise designated by the jurisdiction</u>; and
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the building official and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

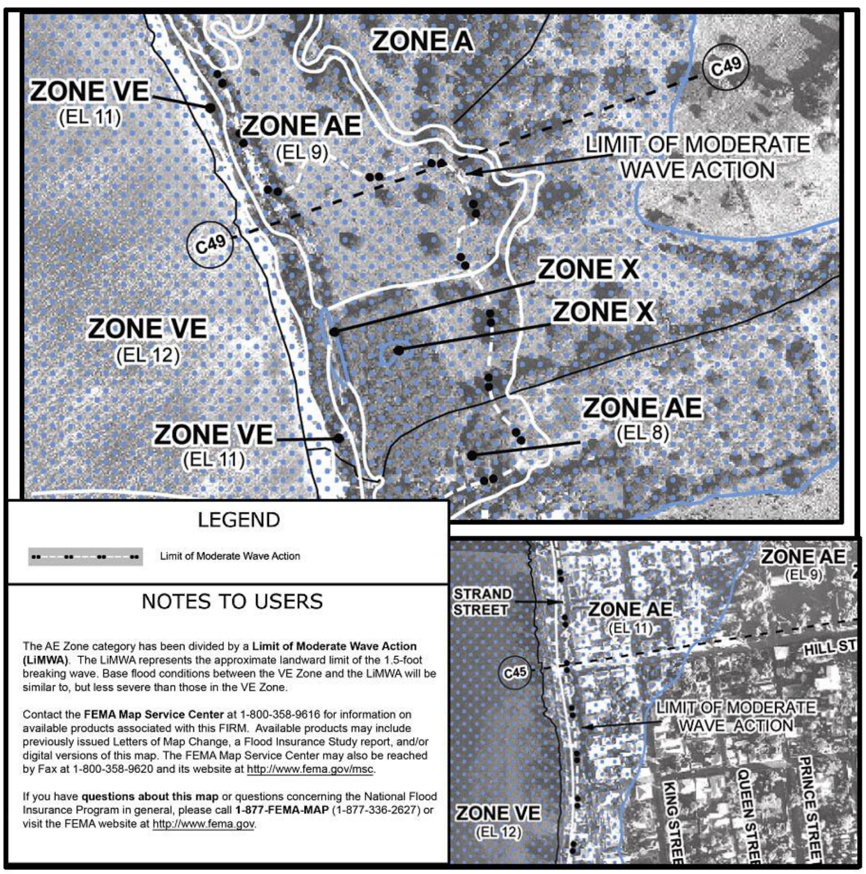
Reason: This proposal would require that dwellings in areas designated as "Coastal A Zones" meet the requirements of Section 322.3 for dwellings in coastal high hazard areas (Zone V), including open foundations (pilings or columns) with an exception that permits filled stemwalls.

The Coastal A Zone (CAZ) has been in ASCE 7 since the late '90s and in ASCE 24 since its initial publication in 1998. Recognition of CAZ was added to the 2009 edition of IRC Section R322.2, with the only requirement that if the area subject to waves between 1.5 ft and 3 ft is delineated, then the area is designated a Coastal A Zone and lowest floors shall be at least one-foot above the design flood elevation (i.e., in all other respects, the 2009 and 2012 IRC requires dwellings in Coastal A Zones to comply with the requirements for Zone A).

The inland boundary of the coastal high hazard area (Zone V) is drawn by FEMA where breaking wave heights are expected to drop below 3.0 ft during base flood conditions. The requirements for foundations of dwellings that are located just landward of the Zone V boundary are predicated on the assumption that hydrodynamic loads associated with waves – even waves that are 2.9-ft – are not significant and that conventional foundations such as perimeter walls can resist those loads and associated erosion and local scour.

FEMA's many post-disaster investigations after severe coastal storms have long recommended application of coastal high hazard area (Zone V) requirements to areas inland of the Zone V/Zone A boundary – in the area subject to waves between 1.5 ft and 3 ft – the area now referred to as "Coastal A Zone". Starting in fiscal year 2009, all coastal flood studies by FEMA will include analyses of moderate wave action and FIRMs will show the Limit of Moderate Wave Action (LiMWA).

The total land area that is likely to be designated as CAZ is small. FEMA has estimated that less than 3 percent of all mapped flood hazard areas are Zone V and the LiMWA generally is determined to be a relatively short distance inland from the Zone V boundary. The graphic below is from the December 2008 Procedure Memorandum No. 50 which established FEMA's policy to delineate the LiMWA on FIRMs



Every FEMA publication on coastal construction since mid-2000 has recommended the use of Zone V construction requirements in Coastal A Zones. As early as 1979 some communities were augmenting the minimum NFIP requirements because of observed wave damage to conventional, closed foundations (Santa Rosa Island Authority, Florida, 1979). FEMA's first Coastal Construction Manual, published in 1981, recognized that "high velocity water may be experienced due to the forward momentum of breaking waves, especially in the vicinity of the V zone/A zone interface." The defined term "Coastal A Zone" is used in the 1986 revision of the Coastal Construction Manual, and numerous papers and investigations have followed. Research performed in 1992 for the U.S. Army Corps of Engineers demonstrated that buildings on typical Zone A foundations (masonry walls, masonry piers, shallow piles, and slabs) "would be subject to failure for shallow erosion and /or wave heights less than 2-3 feet."

Observations after Superstorm Sandy continue to reinforce the damage potential in areas just inland of the Zone V boundary. FEMA's report based on field investigations will be completed mid-2013. Given that open foundations (piles and columns) perform well under velocity and wave conditions, FEMA believes it is time for the IRC to acknowledge that dwellings in Coastal A Zones should meet the same requirements as dwellings in coastal high hazard areas – with the exception of filled stemwalls that account for the potential for scour and erosion. Surveys and press reports after major coastal events such as Superstorm Sandy regularly report that citizens support stricter requirements (see www.reuters.com/article/2012/11/27/us-storm-sandy-newjersey-idUSBRE8AQ0V620121127, http://blog.nj.com/njv_editorial_page/2012/11/editorial_rebuild_carefully.html).

Cost Impact: This proposal will increase the cost of construction in areas shown on Flood Insurance Rate Maps as seaward of the Limit of Moderate Wave Action (or if a community elects to designate areas as "Coastal A Zones"). However, the risk of wave-induced damage or damage due to erosion and local scour is significantly reduced.

R322.1-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that the regulatory process provides an opportunity for everyone to participate, that is what congress intended and that is the procedure that needs to be followed. The proposal does not take into account that all coastal areas are not the same with regard to weather or wave action, yet this proposal applies to thousands and thousands of existing and new dwellings. Pulling coastal A areas into V Zones has far reaching implications. There have not been enough studies to justify this.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Submitted.

Commenter's Reason: The committee action on this proposal was Disapproval. The reasons for disapproval are not accurate and appear to be based on a misunderstanding of the forces associated with wave action, FEMA's initiative to delineate areas subject to moderate wave action areas on Flood Insurance Rate Maps, and how those areas are determined. When FEMA delineates such areas, a Limit of Moderate Wave Action (LiMWA) is shown on the FIRM and the area between the LiMWA and the Zone V boundary is called the Coastal A Zone (see R322.2).

By definition, the engineering analyses that evaluate wave action take into account that all coastal areas are not the same. Many locational factors are considered when FEMA evaluates whether to delineate a LiMWA, including fetch (length of open water over which wind blows to generate waves), orientation of the shoreline to prevalent direction of wind and waves, land elevation relative to water depths, and the presence of dunes, buildings, and other elements of the landscape that have the effect of breaking up waves. Many reaches of shoreline subject to tidal flooding do not have conditions that produce moderate wave action, in which case the FIRM will not show a LiMWA.

The concept of the Coastal A Zone and recognition of the fact that waves inland of the Zone V boundary, while less than 3-ft in height, cause damage was first documented in a paper presented by FEMA at the 1990 conference of the Association of State Floodplain Managers. Many subsequent studies and reports, and post-disaster investigations, have reinforced that finding.

For more than 20 years FEMA has documented Mitigation Assessment Team investigations that were conducted after many major coastal disasters. Virtually every report identifies damage due to moderate waves and calls for application of Zone V requirements: Hurricane Opal (1995), Hurricane Fran (1996), Hurricane Georges (1998), Hurricane Isabel (2003), Hurricane Ivan (2004), Hurricane Dennis (2005), Hurricane Katrina (2005), and Hurricane Ike (2008). In addition, the 1998 editions of ASCE 7 and ASCE 24 require consideration of moderate wave action and application of Zone V requirements in Coastal A Zones.

Observations after last year's Hurricane Sandy continue to reinforce the damage potential in <u>open coast</u> areas just inland of the Zone V boundary. FEMA's report based on field investigations will be completed mid-2013.

Given that open foundations (piles and columns) perform well under velocity and wave conditions, it is time for the IRC to acknowledge that dwellings in Coastal A Zones should meet the same requirements as dwellings in Zone V. The exception, as specified in the code proposal, is filled stemwalls that provide resistance to wave loads and that have deeper footings that account for the potential for scour and erosion. Surveys and press reports after major coastal events regularly report that citizens support stricter requirements (see http://www.reuters.com/article/2012/11/27/us-storm-sandy-newjersey-idUSBRE8AQ0V620121127 and http://blog.nj.com/njv_editorial_page/2012/11/editorial_rebuild_carefully.html).

RB180-13

Final Action: AS AM AMPC____ D

RB183-13
R322.1.8

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council (dpitts@awc.org)

Revise as follows:

R322.1.8 Flood damage-resistant materials. Building materials and installation methods used below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2. ~~comply with the following:~~

1. ~~All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use or be the decay–resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWPA U1.~~
2. ~~Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA-TB-2.~~

Reason: This proposal reflects changes approved to the IBC in FS150-12. Adoption of this change will make the IBC and IRC consistent. The specific requirement for preservative-treated wood or naturally decay-resistant wood below the elevation required in Section R322.2 is deleted because wood products such as plywood sheathing, plywood panel siding, and stud walls have been shown to be resistant to the effects of flood exposure without the aid of preservatives or the use of naturally durable wood.

Primary considerations for material performance and use in flood hazard areas are outlined in FEMA *TB2, Flood Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, which is already referenced in the IRC. A flood damage resistant material is one that is "… capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage." Evaluation consists of consideration of material performance following 72 hour immersion and presence of only limited damage requiring no more than cosmetic repair (i.e. cleaning, sanitizing and resurfacing such as sanding, repair of joints, repainting). Research conducted by Oak Ridge National Laboratory and Tuskegee University (ORNL/TM-2005/34 *Field Testing of Energy-Efficient Flood-Damage-Resistant Residential Envelope Systems Summary Report,* June 2004) and field observations of material performance from actual floods were considerations in the update of FEMA TB2-2008. Within TB2 examples of wood that are not required to be preservative treated for flood damage resistance that may form a part of exterior walls and floors include studs and Exterior and Marine plywood used as wall sheathing. While preservative treated studs and preservative treated exterior plywood sheathing were not tested in the ORNL/Tuskegee study, it is not expected that presence of preservative treatment would improve the already acceptable performance of these materials.

General requirements for preservative treated or naturally durable wood for protection from decay and termites are addressed elsewhere in the IRC, and those applications will continue to be in effect, including in flood hazard areas.

Cost Impact: No increase in the cost of construction.

R322.1.8-RB-PITTS

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify proposal as follows:

R322.1.8 Flood damage-resistant materials. Building materials and installation methods used for flooring and interior and exterior walls and wall coverings below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2.

Committee Reason: The committee approved this code change proposal because they felt that it clarifies where flood damage-resistant materials are required. The modification added language that specified the affected building components, thereby further clarifying the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dallin Brooks, Western Wood Preservers Institute, representing Ted LaDoux, requests Disapproval.

Commenter's Reason: RB-183 removes the required use of preservative treated wood from FEMA Standard where not specified by other areas of the code in order for wood to be considered flood damage resistant below the base flood elevation. By eliminating the use of preservative treated wood from the code other wood panel products that are not pressure treated such as (for example OSB and fiberboard sheathing) and other engineered wood products can structurally fail upon wetting affecting the strength of various wood products. In addition the proposal lacks sufficient health information, and ignores conditions that may or may not be met by the builder/occupier resulting in higher risks, than if the code were to remain in effect as is.

The basis for RB-183 is a study done by the ORNL/Tuskegee entitled Field Testing of Energy-Efficient Flood-Damage-Resistant Residential Envelope Systems and published in June 2004.

However, as the report points out several factors were not taken into consideration.

1. "While flood damage resistance includes both physical and human health factors, the experimental modules were tested only for resistance to physical degradation that results from the wetting and drying cycle associated with flooding."

Ignoring the human health impact, while, suitable for a study is not suitable for code policy change. It clearly violates the ICC vision to "Protect the **health**, safety and welfare of people by creating safe buildings and communities." Information must be presented on the human health risks of using untreated wood below the base flood elevation in the event of a flood.

2. "Testing did not address the structural impact on the envelope of externally applied hydrostatic pressures."

The hydrostatic pressure is not differentiated between untreated and treated treated wood of the same product (for example treated plywood and untreated plywood) however substitute products such as fiberboard and OSB may preform differently.

3. "Bacteriological and toxic materials testing were not performed during this series of tests."

Bacteria, mold and fungi are more likely to grow on untreated wood than on preservative treated wood, again this brings up the issue of human health in areas after a flood.

The report also concludes

1. "…older, weathered siding of the same materials and/or repeated wetting and drying over several cycles is projected **to significantly degrade the restorability** of these siding materials."

Such a statement clearly indicates that some products need to be preserved more than others. Thus such a code change should address each individual application or should meet the lowest common factor where health and safety are concerned.

2. "Plywood sheathing maintained its integrity and mechanical properties. However, **it had not dried to preflood levels after 30 days**. Because water does not tend to escape quickly from behind plywood siding, the combination of [untreated] plywood siding and sheathing was not considered a good flood damage resistant system."

While pointing out that the strength is there, this does not address the fact that staying wet beyond 30 days raises the concern that no consideration was given for mold and bacteria effecting human health.

3. "*Wood Framing* - Moisture levels in wood studs that were above the flood level returned to preflood levels within the drying period. That portion of the studs below the flood level was drying towards the pre-flood moisture content, but had not in most cases achieved that level during the drying period. The wood studs also maintained their strength (all Modules). Wood studs were considered flood damage resistant **as long as the wall system will permit them to continue to dry to normal levels."**

Without clarifying the condition that a wall system must meet for the wood frame to dry to normal levels, one can assume two things, that some wall systems do not allow the studs to dry to normal levels, and that someone will build such a system below the flood base. Either way, without defining the conditions such a statement may have a negative effect on the building industry and human health and safety.

4. *"Floor Structure* - The sealed concrete floor slab in all slab-on-grade modules remained undamaged during and after flooding. The wood sub-flooring retained very high moisture content throughout the drying period when unfaced fiberglass batt insulation was installed underneath the sub-flooring. When no floor insulation was used, the subflooring returned to pre-flood moisture levels during the drying period. **Wood subflooring and framing insulated with fiberglass batts could experience long term moisture related problems."**

Long term moisture related problems are not as significant if the wood is preservative treated.

5. *"Foundation Vents -* The operable flood vents were closed prior to flooding and opened by themselves during the filling and draining of the flood water. They operated as designed. These vents were blocked open throughout the drying period. The crawl space humidity reached 100% and remained high during the drying period. **This humidity level is unacceptable in the long term since it could contribute to both mold and wood decay.** It is believed that the high humidity level in the crawl space was the result of the test module being placed in a basin that was subjected to significant amount of rain throughout the drying period. In order to keep from providing a path for mold to enter the interior of the module, the crawl space area must be effectively sealed from the interior of the house."

Wood decay is inhibited by the preservative in treated lumber, ensuring that such a situation is minimized.

Additional concerns for human factors that are not accounted for in RB-183.

1. How many people use their flood insurance, or let it go unfixed due to financial constraints such as deductible or increased rates?
2. How many renters, landlords or sellers do not report flooding to the next tenant? Previous flood damage, poses a risk of decay, bacteria and mold growing in the unseen wood structure.
3. It is generally accepted that floods are happening at an increasing rate, intensity and height due to climate change and other factors. This is having an increasingly large cost to insurance and rebuilding efforts. "The Federal Emergency Management Agency (FEMA) reports that each year approximately 90 percent of all disaster-related property damage results from flooding. Over the past decade, the average flood claim in the United States has been more than $46,000 with yearly totals averaging $3.5 billion per year." Structural Damage Due to Floods By Craig D. Rogers, P.E. http://wwpi.info/FloodStructuralDamage

Clearly the practical differs from the ideal, thus the ideal situation is to meet at the lowest common standard. While pressure treated wood is used in many applications already below the flood base, it clearly can meet the lower targets and avoid situations of neglect that may affect public health and safety.

When you have to put conditions on performance and those conditions are not also regulated then the performance to the non-conditioned state must be expected. Including the use of materials such as OSB and fiberboard that do not have the same performance characteristics when wetted. Hence there is significant concern for human health and safety that RB-183 should not be approved to allow untreated wood to be considered flood resistant until further research can be done. RB-183 should be disapproved for these reasons.

RB183-13

Final Action: AS AM AMPC____ D

RB187-13
R322.1.9 (New)

Proposed Change as Submitted

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

Add new text as follows

R322.1.9 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Sections R322.2.1 or R322.3.2, as applicable to the flood hazard area, shall either:

1. Be designed and constructed to resist flood-related loads and to minimize transfer of flood-related loads to the building or structure; or
2. Break away during design flood conditions without causing damage to the building or structure; or
3. Be retractable, or be able to be raised, to or above the lowest floor elevations, provided the ability to be retracted or raised prior to onset of conditions of flooding is not contrary to means of egress requirements of the code.

(Renumber subsequent sections)

Reason: This proposal lays out options for satisfying the general requirement in R322.1.3 which requires "All buildings and structures erected in flood hazard areas shall be constructed by methods and practices that minimize flood damage." That means stairways and ramps should resist flood loads along with the dwellings they serve. These same requirements are included in ASCE 24-13.

In coastal high hazard areas (Zone V), stairs that are not properly constructed to meet the free-of-obstructions requirement below elevated buildings can damage the building when they fail. This damage has been observed during FEMA's post-flood investigations after numerous flood events (also see Figure 1 from NFIP Technical Bulletin 2 Free-of-Obstruction Requirements).

Figure 1. Stairs did not break away cleanly, resulting in damage to the elevated building.

Cost Impact: There should be no additional costs because of the existing requirement in R322.1.3.

R322.1.9-(NEW)-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it is difficult to anchor at a breakaway point and because anchorage is more important with regard to stairs. It becomes a life safety issue in the sense that proper anchorage ensures that no one falls and that the stair has a long life. In addition, there is no information to support cost benefits in A Zones and anything that breaks away is likely to damage something.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gregory Wilson (FEMA) and Rebecca Quinn (RCQuinn Consulting), representing US Dept of Homeland Security, Federal Emergency Management Agency and RCQuinn Consulting, Inc. representing FEMA, requests Approval as Modified by this Public Comment,

Modify the proposal as follows:

~~R322.1.9~~ $322.3.6 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Section R322.3.2 ~~Sections R322.2.1 or R322.3.2, as applicable to the flood hazard area,~~ shall either:

1. Be designed and constructed to resist flood-related loads and to minimize transfer of flood-related loads to the building or structure; or
2. Break away during design flood conditions without causing damage to the building or structure; or
3. Be retractable, or be able to be raised, to or above the lowest floor elevations, provided the ability to be retracted or raised prior to onset of conditions of flooding is not contrary to means of egress requirements of the code.

Commenter's Reason: The committee action on this code change proposal was Disapproval. The proposed modification addresses the committee's concern about applying the requirement in Zone A by moving it to Section R322.3, which applies only in coastal high hazard areas (Zone V) where waves are expected to be 3 ft or higher during the base flood. The committee's reason statement also identified concerns with proper anchorage, however, as evidenced by post-disaster investigations, stairs and ramps may be adequately connected to the building to meet safety requirements but still be designed to break away under flood loads. Plus, the proposal has the alternative that stairs and ramps can remain intact provided they resist flood-related loads and minimize transfer of loads to the building, which has also been observed to be successful.

RB187-13
Final Action: AS AM AMPC____ D

RB190-13

R322.2.3, Table R322.2.3(1) (New), Table R322.2.3(2) (New), R404.1.3

Proposed Change as Submitted

Proponent: Greg Wilson, US Dept of Homeland Security, Federal Emergency Management Agency (Gregory.P.Wilson@dhs.gov); Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R322.2.3 Foundation design and construction. Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4 subject to the following limitations:

1. Plain masonry walls are not permitted.
2. Masonry walls in flood hazard areas not designated as Coastal A Zones, shall comply with Table R322.2.3(1) or shall be designed in accordance with ASCE 24.
3. Masonry walls in flood hazard areas designated as Coastal A Zones, shall comply with Table R322.2.3(2) or shall be designed in accordance with ASCE 24.

~~**Exception:** Unless designed in accordance with Section 404:~~

~~1. The unsupported height of 6-inch (152 mm) plain masonry walls shall be no more than 3 feet (914 mm).~~
~~2. The unsupported height of 8-inch (203 mm) plain masonry walls shall be no more than 4 feet (1219 mm).~~
~~3. The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be no more than 8 feet (2438 mm).~~

~~For the purpose of this exception, unsupported height is the distance from the finished grade of the under-floor space to the top of the wall.~~

TABLE R322.2.3(1)
MASONRY WALLS IN FLOOD HAZARD AREAS NOT DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT[a] (feet)	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)[b,c]
8-inch, with reinforcing in accordance with Table R404.1.1(2)	7	#4 at 48
	10	#4 at 24 or #5 at 40
10-inch, with reinforcing in accordance with Table R404.1.1(3)	7	#4 at 56
	10	#4 at 32 or #5 at 48
12-inch, with reinforcing in accordance with Table R404.1.1(4)	7	#4 at 72
	10	#4 at 40 or #5 at 64

a. Unsupported wall height is the distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.

b. If unbalanced fill conditions exist, then vertical reinforcement shall be the greater of that required by this table or referenced table in Section R404 (Tables R404.1.2(2) through R404.1.2(4))

TABLE R322.2.3(2)
MASONRY WALLS IN FLOOD HAZARD AREAS DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT[a] (feet)	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)
8-inch, with reinforcing in accordance with Table R404.1.1(2)	2	#4 at 48
	3	#4 at 32 #5 at 48
10-inch, with reinforcing in accordance with Table R404.1.1(3)	4	#4 at 16 #5 at 24
12-inch, with reinforcing in accordance with Table R404.1.1(4)	5	#4 at 8 #6 at 16

a. Unsupported wall height is the distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when one ~~either~~ of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.
3. Masonry walls in flood hazard areas other than coastal high hazard areas that do not conform to the limitations in of R322.2.3 shall be designed in accordance with ASCE 24.

Reason: Current criteria for prescriptive masonry foundation wall construction per Tables R404.1.1(1) through (4) of Section R404 are based on wall height, soil classification, and unbalanced fill. However, for locations in flood hazard areas when wall sections are analyzed with applicable flood loads, the limits on wall height are typically driven by flood depth (per elevation requirements in R322.2.1) and are less often a function of site grade changes that result in lateral loads from unbalanced fill.

IRC Section R322.2.3 permits construction of masonry foundation walls in flood hazard areas per Section R404 with height restrictions on plain masonry and 8" reinforced masonry walls. The wall height limitations in R322.2.3 are based on analyses performed in 1998 for a range of flood depths and flood velocities. FEMA re-examined those limitations this year after observing wall damage.

Foundation walls in flood hazard areas may be susceptible to hydrostatic forces (addressed by the requirement for flood openings in R322.2.2) and hydrodynamic forces imposed by moving water and moderate breaking wave loads on vertical walls with wave heights between 1 ½ feet and 3 feet (see R322.2, if areas subject to such waves are delineated, they are designated "Coastal A Zones"). FEMA evaluated the resistance of masonry walls of variable heights, with flood openings, to a range of velocities and a range of wave heights, in combination with wind loading conditions covered in the IRC. FEMA used Allowable Stress Design (ASD) Load Combination 7, according to ASCE 7-10 Section 2.4.2 (2).

The hydrodynamic load analyses yielded the proposed wall height limitations and the corresponding minimum vertical reinforcement for 8", 10" and 12" thicknesses. Assumptions included:

1. 1- Story wood-framed residential structure supported on masonry foundation walls with flood openings installed per IRC R322.2.2
2. Top of foundation wall braced by elevated floor system
3. Material strengths per standards referenced in the IRC
4. All wood-frame shear resisting walls are on the exterior; foundation wall shear loads are limited by the capacity of the IRC-compliant light-frame braced walls
5. For analysis of wall sections in Zone A other than Coastal A Zones, the maximum flood velocity evaluated is 6 fps

As an example of how the results of the new analyses demonstrate the need to revise the limitations, the analysis indicates 8" reinforced masonry walls per Table 404.1.1.(2), with minimal reinforcement of #4 bar at 48" on center for an 8 ft high wall have a design strength of 32 ksi in axial tension and flexure. When just an 18" breaking wave load is applied to a 3' high wall at mid-height, the resulting ASD factored force in flexure exceeds 38 ksi.

The analyses also demonstrate the need to specify minimal reinforcement. When wind and flood loads are applied under Allowable Stress Design (ASD) Load Combination 7 per ASCE 7-10 Section 2.4.2 (2), net tension results at the top of the foundation wall from the minimum ASCE 7-10 basic wind speed of 115 mph (Exposure Category B). Higher design wind speeds result in greater uplift. The design criteria of ACI-530 Section 2.2.4 specifies that the tensile strength of unreinforced masonry shall be neglected when subjected to axial tension forces. Accordingly, unreinforced wall sections analyzed with net axial tension at the top of wall from the combined effects of wind and flood loading have been disallowed. ACI-530 commentary to Section 2.2.4 further stipulates, "*Net axial tension in unreinforced masonry walls due to axially applied load are not permitted. If axial tension develops in walls due to uplift of connected roofs or floors, the walls must be reinforced to resist the tension. Compressive stress from dead load can be used to offset axial tension."*

Evidence from FEMA's post-disaster Mitigation Assessment Team reports indicates residential unreinforced masonry (URM) wall failure under design wind (see FEMA P-908, Spring 2011 Tornadoes) and flood loads (see FEMA P-765, Midwest Floods of 2008 in Iowa and Wisconsin). MAT teams deployed shortly after Hurricane Sandy have documented numerous examples of failed unreinforced and lightly reinforced walls sections in areas shown on Flood Insurance Rate Maps as Zone A, both with and without moderate wave.

Cost Impact: The code change proposal will increase the cost of construction for a limited set of perimeter wall foundations in flood hazard areas, but will reduce the likelihood of failure under anticipated flood loads, and thus will decrease future costs associated with rebuilding after flood and flood/high wind events.

R322.2.3-RB-OVERCASH-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that it addressed property loss mitigation instead of life safety. The cost would be insignificant as compared to the savings. The increase in the first time costs could be significant. We may not want to use the code to mitigate costs to insurers. The proposal does not provide enough specific guidance.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Greg Wilson, US Dept of Homeland Security, Federal Emergency Management Agency and Glenn Overcash, URS Corporation representing FEMA, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.2.3 Foundation design and construction. Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4 subject to the following limitations:

1. Plain masonry walls are not permitted.
2. Masonry walls in flood hazard areas not designated as Coastal A Zones, shall comply with Table R322.2.3(1) or shall be designed in accordance with ASCE 24.
3. Masonry walls in flood hazard areas designated as Coastal A Zones, shall comply with Table R322.2.3(2) or shall be designed in accordance with ASCE 24.

TABLE R322.2.3(1)
MASONRY WALLS IN FLOOD HAZARD AREAS NOT DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT[a] ~~(feet)~~	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)[b]
8-inch, with reinforcing in accordance with Table R404.1.1(2)	7 feet 4 inches	#4 at 48
	8 feet	#4 at 40
	8 feet 8 inches	#4 at 32
	9 feet 4 inches	#4 at 24 or #5 at 40
	10 feet	#4 at 24 or #5 at 40
10-inch, with reinforcing in accordance with Table R404.1.1(3)	7 feet 4 inches	#4 at 56
	8 feet	#4 at 48
	8 feet 8 inches	#4 at 40
	9 feet 4 inches	#4 at 32 or #5 at 56
	10 feet	#4 at 32 or #5 at 48
12-inch, with reinforcing in accordance with Table R404.1.1(4)	7 feet 4 inches	#4 at 72
	8 feet	#4 at 64
	8 feet 8 inches	#4 at 48
	9 feet 4 inches	#4 at 40 or #5 at 72
	10 feet	#4 at 40 or #5 at 64

a. Unsupported wall height is the difference in height between the top of foundation wall and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. ~~distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.~~

b. If unbalanced fill conditions exist, then vertical reinforcement shall be the greater of that required by this table or referenced table in Section R404 (Tables R404.1.2(2) through R404.1.2(4))

TABLE R322.2.3(2)
MASONRY WALLS IN FLOOD HAZARD AREAS DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	UNSUPPORTED WALL HEIGHT[a] ~~(feet)~~	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)
8-inch, with reinforcing in accordance with Table R404.1.1(2)	2 feet	#4 at 48
	2 feet 8 inches	#4 at 48 or #5 at 48
	3 feet 4 inches	#4 at 16 or #5 at 32
	4 feet	#5 at 8
10-inch, with reinforcing in accordance with Table R404.1.1(3)	4 feet	#4 at 16 or #5 at 24
	4 feet 8 inches	#5 at 8
12-inch, with reinforcing in accordance with Table R404.1.1(4)	4 feet 8 inches	#4 at 8 #5 at 16
	5 feet 4 inches	#5 at 8

a. Unsupported wall height is the difference in height between the top of foundation wall and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. ~~distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.~~

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when one or more of the following conditions exist:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.
3. Masonry walls in flood hazard areas other than coastal high hazard areas that do not conform to the limitations in of R322.2.3 shall be designed in accordance with ASCE 24.

Commenter's Reason: Modifications to Code Change Proposal RB190-13 are in response to the Committee Reason for Disapproval that includes the statement that "(the) proposal does not provide enough specific guidance". To address the lack of individual prescriptive solutions for wall heights between 7 and 10 feet, rows were added to Table 322.2.3(1) to provide more efficient and economical solutions. Furthermore, wall heights are now indicated in 8" increments to match the format of Chapter 4 masonry wall reinforcement tables (Tables R404.1.1(2-4)). Modified wall height criteria that directly correspond with standard concrete masonry unit height will facilitate field application for the builder and subsequent verification by code officials.

In response to the Committee Reason for Disapproval that asserts Code Change Proposal RB190-13 "address(es) property loss mitigation instead of life safety" and that "(w)e may not want to use the code to mitigate costs to insurers", the following justification is offered: the committee's reason is not consistent with the intent of the IRC:

> "**R101.3 Intent.** The purpose of this code is to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability … and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations." [emphasis added]

Some homeowners do not carry flood insurance and flood-related damage is not covered by homeowners insurance. Preventing failure of masonry foundation walls by providing prescriptive solutions that specifically address flood hazards clearly meets the intent of the IRC.

The current wall height limitations in R322.2.3 are based on analyses performed in 1998. FEMA re-examined those limitations in 2012 after observing unreinforced masonry wall damage during post-disaster investigations. The new analysis (described in detail in the original Proposal Reason Statement) was developed through collaboration with industry groups and applies flood loads using updated standards that are referenced in the 2012 IRC.

The new analysis results: some masonry wall solutions prescribed in the existing code for flood hazard areas are structurally deficient. Tables 322.2.3(1) and 322.2.3(2) correct those deficiencies and are more user-friendly than the existing provisions. The existing provisions of R322.2.3 are also difficult to interpret; Code Change Proposal RB190-13 clarifies requirements for builders and code officials.

RB190-13

Final Action: AS AM AMPC____ D

RB191-13

R322.2.4 (New), R322.3.3, R322.3.4 (New)

Proposed Change as Submitted

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

Revise as follows:

R322.2.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located below the base flood elevation shall be structurally independent of the primary foundation systems of buildings or, where structurally connected, the main structure shall be capable of resisting any added flood loads and effects of scour due to the presence of the slabs.

(Renumber subsequent sections.)

R322.3.3 Foundations. Buildings and structures erected in coastal high-hazard areas shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section 401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24. ~~Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.~~

R322.3.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located beneath or adjacent to structures shall be designed and constructed to:

1. Be structurally independent of the primary foundation system of the structure, do not transfer flood loads to the main structure, are constructed to break away cleanly, and are frangible so as to not produce debris capable of causing significant damage to any structure. Reinforcing of concrete slabs, including welded wire reinforcement, shall not be used so as to minimize the potential for concrete slabs being a source of debris. Slabs shall not have turned down edges and slab thickness shall be not more than 4 inches; or
2. Be self-supporting structural slabs capable of remaining intact and functional under base flood conditions, including expected erosion, and the main structure shall be capable of resisting any added flood loads and effects of local scour due to the presence of the slabs.

(Renumber subsequent sections.)

Reason: This proposal includes specifications for concrete slabs that are not found elsewhere in the IRC. Under flood conditions, the presence of concrete slabs can contribute to building damage. The existing language in R322.2 (Zone A) does not provide any specifications and the existing language in R322.3.3 (Zone V) does not provide any specifications for concrete slabs themselves; it only specifies that slabs are to be structurally independent of buildings, unless the buildings are designed to account for the added flood loads. The specific requirements are consistent with revised ASCE 24-13.

Cost Impact: There should be no added cost; the benefits are associated with less potential damage.

R322.2.4 (NEW) #1-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that it contained unenforceable language such as the phrase "debris that causes significant damage to a structure." In addition, scouring does not take place in all areas of the United States, yet these proposed changes apply to all areas. Sometimes slabs must have turned down edges for frost protection purposes.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.3.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located beneath or adjacent to structures shall be designed and constructed:

1. To be structurally independent of the primary foundation system of the structure, to ~~do~~ not transfer flood loads to the main structure, and to be frangible and break away under conditions of the base flood ~~are constructed to break away cleanly, and are frangible so as to not produce debris capable of causing significant damage to any structure~~. Reinforcing of concrete slabs, including welded wire reinforcement, shall not be used so as to minimize the potential for concrete slabs being a source of debris. Slabs shall not have turned down edges and slab thickness shall be not more than 4 inches; or
2. To be self-supporting structural slabs capable of remaining intact and functional under base flood conditions, including expected erosion, and the main structure shall be capable of resisting any added flood loads and effects of local scour due to the presence of the slabs.

(Portions of proposal not shown to remain unchanged.)

Commenter's Reason: The committee action on this code change proposal was Disapproval. This public comment replaces the original proposal. It does not change the original proposed new Section R322.2.4 for Zone A flood hazard areas, and it does not change the original proposal to delete the last sentence of Section R322.3.3 for Zone V (coastal high hazard areas where wave heights are 3 feet had higher).

This public comment does modify the proposed new Section R322.3.4 by removing the phrase that the committee found objectionable. Instead, this public comment requires concrete slabs in Zone V to be frangible (means "easily broken") and to break away under flood conditions. The expectation is this will minimize the size of debris and thus minimize the likelihood of causing significant damage to structures. For many years, many local floodplain management ordinances adopted by coastal communities have used the term "frangible."

The limitation on turned-down edges in Zone V is retained. Field experience shows that slabs intended to breakaway but that have turned-down edges do not break away cleanly when undermined by wave scour or erosions, which can cause damage to foundations. In Zone V, concrete slabs are not permitted to be used as structural foundation elements, thus it is not problematic to limit turned-down edges and thickness for nonstructural slabs used for the stated purposes.

RB191-13

Final Action: AS AM AMPC____ D

RB192-13
R322.2.4 (New), R322.3.6 (New)

Proposed Change as Submitted

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

Add new text as follows:

R322.2.4 Decks and porches. Attached and detached decks and porches that are not enclosed by solid, rigid walls and that are located below the elevations specified in Section R322.2.1 shall comply with the following:

1. Attached decks and porches shall be designed to function as a continuation of the building or structure.
2. Detached decks and porches shall be anchored to remain in place during base flood conditions.

R322.3.6 Decks and porches. Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall meet the foundation requirements of this section or be cantilevered from or knee braced to the building or structure. Detached decks and patios that are below the elevation requirements of Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Detached decks and patios shall be designed and constructed to remain intact and shall be anchored to remain in place during base flood conditions, or shall be frangible and break away cleanly so as not to produce debris capable of causing significant damage to any structure.

Reason: The IRC does not have specific requirements for decks and porches that are common elements for dwellings. These same requirements are included in ASCE 24-13.

Attached decks and porches can be elevated to the same requirements as dwellings. If not elevated, they can contribute to loads on buildings under flood conditions, so the buildings should be designed to account for those added loads. Decks and patios can be detached (structurally independent), in which case they can be below the elevation of buildings (provide they are not enclosed with walls – screen and lattice are not walls for this purpose). Detached decks and patios either have to be anchored so they don't become large debris that can batter other buildings or block drainage structures.

Cost Impact: Electing to structurally attach decks or patios would likely increase foundation costs, but the alternative is to choose to use detached decks and patios. Decks and patios are structures and have always been subject to the general NFIP requirement to be constructed by methods and practices that minimize flood damage and to be stable under flood conditions, both are included in the IRC at R322.1.2 and R322.1.3.

R322.2.4 (NEW) #2-RB-QUINN

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it left too many questions unanswered that create confusion for the designer, engineer and code official. Some of the proposed modifications helped, but were not enough. This proposal is far reaching. If it was narrowed down in scope to costal V Zones and areas where there is wave action it might be more worthy of consideration.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

<u>**R322.3.6 Decks and porches.** Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall either meet the foundation requirements of this section or shall be cantilevered from or knee braced to the building or structure. Detached decks and patios that are below the elevation requirements of Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Detached decks and patios shall be designed and constructed to remain in place during base flood conditions, or shall be frangible and break away under conditions of the base flood.</u>

Commenter's Reason: The committee action on this code change proposal was Disapproval. At the committee's suggestion, this public comment replaces the original proposal with the provision that applies only to decks in coastal high hazard areas (Zone V) where waves are expected to be 3 feet or higher during the base flood.

This public comment also modifies the original proposal for Zone V by removing language about damage to other structures, which the committee found objectionable in another proposal. The expectation is the requirement that decks not designed to remain intact are to be frangible (means "easily broken") which will minimize the size of debris and thus minimize the likelihood of causing significant damage to structures. For many years, many local floodplain management ordinances adopted by coastal communities have used the term "frangible."

RB192-13
Final Action: AS AM AMPC____ D

RB193-13
R322.2.4 (New), R322.3.7 (New), M2201.6

Proposed Change as Submitted

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

Add new text as follows:

R322.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood and shall be protected from impact by floating debris.

R322.3.7 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall conform to the foundation requirements of Section R322.3.

Revise as follows:

M2201.6 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1), tanks shall be installed in accordance with Section R322.2.4 (flood hazard areas including Zone A) or Section R322.3.7 (coastal high-hazard areas including Zone V). ~~at or above the elevation required in Section R322.2.1 or R322.3.2 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the design flood.~~

Reason: This proposal more clearly separates underground tanks from above-ground tanks. Dislodged tanks not only can release contents into floodwaters, but they become battering debris that can contribute to structural damage.

Underground tanks need to be installed in ways that take into consideration the fact that soils may be saturated during flooding, creating conditions that can cause tanks to be dislodged. This occurs after many flood events; most recently, problems with tanks were observed throughout the Hurricane Sandy impact area.

How above-ground tanks that serve dwellings are handled depends on flood zone. In coastal high hazard areas (Zone V) above-ground tanks have to be elevated – they may be elevated on separate platforms or on platforms that are cantilevered from the elevated building/foundation. In other flood hazard areas (Zone A) above-ground tanks may be elevated, or may be below base flood elevation, provided they are adequately anchored.

These same requirements are included in ASCE 24-13. The NFIP considers tanks as structures and structures have always been subject to the general NFIP requirement to be constructed by methods and practices that minimize flood damage and to be stable under flood conditions, both are included in the IRC at R322.1.2 and R322.1.3.

Cost Impact: None. These requirements articulate how the basic NFIP requirements (and the requirements of R322) should have been applied.

R322.2.4 (NEW) #3-RB-QUINN-WILSON

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it contained information that was not appropriate for the International Residential Code. Tanks are typically regulated by the fire code, zoning code, or fuel gas code. The proposal also lacks specificity with regard to the language “protected from impact by floating debris.”

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood~~ and shall be protected from impact by floating debris~~.

R322.3.7 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall <u>be cantilevered from or knee braced to the building or shall be supported on foundations that</u> conform to the ~~foundation~~ requirements of Section R322.3.

M2201.6 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1), tanks shall be installed in accordance with Section R322.2.4 (flood hazard areas including Zone A) or Section R322.3.7 (coastal high-hazard areas including Zone V).

Commenter's Reason: The committee action on this code change proposal was Disapproval because the committee suggests it is not appropriate for the IRC to have requirements for tanks. However, the IRC does regulate residential oil tanks under M2201 and thus it is appropriate for Section R322 to have specific requirements. In addition, FEMA has received questions about water tanks necessary to meet the IRC fire-suppression requirements in areas without public water supply, which reinforces the value of having requirements in Section R322. The committee also objected to language regarding protection from floating debris, which is removed in this public comment. The original language in R322.3.7 is amended to provide that platforms may either be supported by foundations or be attached to buildings.

RB193-13

Final Action: AS AM AMPC____ D

RB198-13
R322.3.5.1 (New)

<u>Proposed Change as Submitted</u>

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

Add new text as follows:

<u>**R322.3.5.1 Protection of building envelope.** An exterior door that meets the requirements of Section R612 shall be installed at the top of stairs that are enclosed with walls designed to break away in accordance with Section R322.3.4.</u>

Reason: Walls below elevated buildings in coastal high hazard areas (Zone V) are permitted if the area enclosed by walls is used for parking of vehicles, building access or storage. If the enclosed area is used for building access, then a stairway provides access to the elevated building. R322.3.4 requires the walls to be designed and constructed to break away under flood loads. Post-disaster investigations have identified increased damage to the interior of elevated buildings because wave splash, wave run-up, and wind-driven rain can enter buildings through the unprotected doorway at the top of the stairs.

Cost Impact: The added cost of an exterior door is offset by reduced damage caused by wave splash, wave run-up, and wind-driven rain, some of which is not covered by NFIP flood insurance.

R322.3.5.1 (NEW)-RB-QUINN-WILSON

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that the proposed section requires a door at the top of the stair and makes no provisions for conditions where the stair leads to a deck. It is a good concept but it needs work. In hurricane prone areas, the doors that are being discussed could be interior doors and this could create undue additional costs.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency; Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R322.3.5.1 Protection of building envelope. An exterior door that meets the requirements of Section R612 shall be installed at the top of stairs <u>that provide access to the building and</u> that are enclosed with walls designed to break away in accordance with Section R322.3.4.

Commenter's Reason: The committee action on this code change proposal was Disapproval because no provision was made for stairs that lead to decks. Although it would be unusual for stairs that lead to decks to be enclosed by walls, the proposal is modified to clarify that the requirement for an exterior door at the top of stairs applies to stairs that lead to the building and that are also enclosed by breakaway walls. This proposal adds to Section R322.3, which applies in coastal high hazard areas (Zone V) where wave height of greater than 3 feet are expected during the base flood. Walls are permitted to enclose areas below elevated buildings if the walls are designed to break away under flood loads and if the areas are used only for parking, storage and building access (see R322.3.4).

The proposal calls for an exterior door instead of an interior door because the walls enclosing the stairs are designed to break away, thus exposing the door to both wind and water.

RB198-13

Final Action: AS AM AMPC____ D

RB200-13
R324 (New), R325 (New), R326 (New), R327 (New), R328 (New)

Proposed Change as Submitted

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R324 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction, the tests and inspections shall be performed and documented as is required in Chapter 17 of the *International Building Code*.

R325 Swimming Pool Enclosures and Safety Devices. Swimming pools shall comply with the requirements of Sections 3109.2 through 3109.5 and other applicable sections of the *International Building Code*.

R326 Encroachments Into The Public Right-Of- Way. Encroachments into the Public Right-of-Way shall comply with the standards in Chapter 32 of the *International Building Code*.

R327 Safeguards During Construction Provisions for safety during construction and the protection of adjacent public and private properties shall be governed by the requirements of Chapter 33 of the *International Building Code*.

R328 Sound Transmission. Wall and floor-ceiling assemblies separating dwelling units from each other shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor-ceiling assemblies as required in Chapter 12 of the *International Building Code*.

Reason: The IRC is developed as a standalone code however it does not address certain issues regulated by the International Building Code. This code change provides a cross reference to the IBC in lieu of adopting IBC regulations by transcription. The IRC allows multi-unit dwellings and townhouses but does not address sound transmission control between dwelling units and townhouses. Additionally the IRC does not seem to regulate swimming pools, encroachments into the public right of way or safety during construction.

Section R324 is necessary since special inspections and tests may be required by product evaluation reports or due to non-conforming construction that was approved to comply with the IRC may need to be qualified by testing.

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

R324 (NEW)-RB-FATTAH

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because they felt that it includes multiple references to the International Building Code. This is contrary to the intent of the International Residential Code, which is to be a stand-alone code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

R301.1.4 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction pursuant to a product evaluation report or when required by the Building Official, the tests and inspections shall be performed and documented in accordance with Chapter 17 of the *International Building Code*.

Add new Appendix R as follows:

APPENDIX R
ENCROACHMENTS INTO THE PUBLIC RIGHT-OF- WAY

GENERAL
SECTION AR101

AR101.1 Scope. The provisions of this Appendix chapter shall govern the encroachment of structures into the public right-of-way.

AR101.2 Measurement. The projection of any structure or portion thereof shall be the distance measured horizontally from the lot line to the outermost point of the projection.

AR101.3 Other laws. The provisions of this chapter shall not be construed to permit the violation of other laws or ordinances regulating the use and occupancy of public property.

AR101.4 Drainage. Drainage water collected from a roof, awning, canopy or marquee, and condensate from mechanical equipment shall not flow over a public walking surface.

SECTION AR102
ENCROACHMENTS

AR102.1 Encroachments below grade. Encroachments below grade shall comply with Sections AR102.1.1 through AR102.1.3.

AR102.1.1 Structural support. A part of a building erected below grade that is necessary for structural support of the building or structure shall not project beyond the lot lines, except that the footings of street walls or their supports which are located not less than 8 feet (2438 mm) below grade shall not project more than 12 inches (305 mm) beyond the street lot line.

AR102.1.2 Vaults and other enclosed spaces. The construction and utilization of vaults and other enclosed spaces below grade shall be subject to the terms and conditions of the applicable governing authority.

AR102.1.3 Areaways. Areaways shall be protected by grates, guards or other approved means.

AR102.2 Encroachments above grade and below 8 feet in height. Encroachments into the public right-of-way above grade and below 8 feet (2438 mm) in height shall be prohibited except as provided for in Sections AR102.2.1 through AR102.2.3. Doors and windows shall not open or project into the public right-of-way.

AR102.2.1 Steps. Steps shall not project more than 12inches (305 mm) and shall be guarded by approved devices not less than 3 feet (914 mm) in height, or shall be located between columns or pilasters.

AR102.2.2 Architectural features. Columns or pilasters, including bases and moldings shall not project more than12 inches (305 mm). Belt courses, lintels, sills, architraves, pediments and similar architectural features shall not project more than 4 inches (102 mm).

AR102.2.3 Awnings. The vertical clearance from the public right-of-way to the lowest part of any awning, including valances, shall be not less than 7 feet (2134 mm).

AR102.3 Encroachments 8 feet or more above grade. Encroachments 8 feet (2438 mm) or more above grade shall comply with Sections AR102.3.1 through AR102.3.4.

AR102.3.1 Awnings, canopies, marquees and signs. Awnings, canopies, marquees and signs shall be constructed so as to support applicable loads as specified in Chapter 3 or where applicable Chapter 16 of the International Building Code. Awnings, canopies, marquees and signs with less than 15 feet (4572 mm) clearance above the sidewalk shall not extend into or occupy more than two-thirds the width of the sidewalk measured from the building. Stanchions or columns that support awnings, canopies, marquees and signs shall be located not less than 2 feet (610 mm) in from the curb line.

AR102.3.2 Windows, balconies, architectural features and mechanical equipment. Where the vertical clearance above grade to projecting windows, balconies, architectural features or mechanical equipment is more than 8 feet (2438 mm), 1 inch (25 mm) of encroachment is permitted for each additional 1 inch (25 mm) of clearance above 8 feet (2438 mm), but the maximum encroachment shall be 4 feet (1219 mm).

AR102.3.3 Encroachments 15 feet or more above grade. Encroachments 15 feet (4572 mm) or more above grade shall not be limited.

AR102.3.4 Pedestrian walkways. The installation of a pedestrian walkway over a public right-of-way shall be subject to the approval of the applicable governing authority. The vertical clearance from the public right-of-way to the lowest part of a pedestrian walkway shall be not less than 15 feet (4572 mm).

AR102.4 Temporary encroachments. Where allowed by the applicable governing authority, vestibules and storm enclosures shall not be erected for a period of time exceeding seven months in any one year and shall not encroach more than 3 feet (914 mm) nor more than one-fourth of the width of the sidewalk beyond the street lot line. Temporary entrance awnings shall be erected with a clearance of not less than 7 feet (2134 mm) to the lowest portion of the hood or awning where supported on removable steel or other approved noncombustible support.

Add new Appendix S as follows:

APPENDIX S
SAFEGUARDS DURING CONSTRUCTION

SECTION AS101
GENERAL

AS101.1 Scope. The provisions of this Appendix chapter shall govern safety during construction and the protection of adjacent public and private properties.

AS101.2 Storage and placement. Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or adjoining property for the duration of the construction project.

SECTION AS102
CONSTRUCTION SAFEGUARDS

AS102.1 Alterations, repairs and additions. Required exits, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during alterations, repairs or additions to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required when the existing building is not occupied.

AS102.2 Manner of removal. Waste materials shall be removed in a manner which prevents injury or damage to persons, adjoining properties and public rights-of-way.

AS102.3 Fire safety during construction. Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the International Fire Code.

SECTION AS103
DEMOLITION

AS103.1 Construction documents. Construction documents and a schedule for demolition shall be submitted where required by the building official. Where such information is required, no work shall be done until such construction documents or schedule, or both, are approved.

AS103.2 Pedestrian protection. The work of demolishing any building shall not be commenced until pedestrian protection is in place as required by this chapter.

AS103.3 Means of egress. A horizontal exit shall not be destroyed unless and until a substitute means of egress has been provided and approved.

AS103.4 Vacant lot. Where a structure has been demolished or removed, the vacant lot shall be filled and maintained to the existing grade or in accordance with the ordinances of the jurisdiction having authority.

AS103.5 Water accumulation. Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

AS103.6 Utility connections. Service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the applicable governing authority.

AS103.7 Fire safety during demolition. Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 56 of the International Fire Code.

SECTION AS104
SITE WORK

AS104.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Stumps and roots shall be removed from the soil to a depth of not less than 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building. Wood forms which have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.

AS104.1.1 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the building official.

AS104.1.2 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against later movement.

AS104.1.3 Footings on adjacent slopes. For footings on adjacent slopes, see Chapter 4.

SECTION AS105
PROTECTION OF PEDESTRIANS

AS105.1 Protection required. Pedestrians shall be protected during construction, remodeling and demolition activities as required by this chapter and Table AS105. Signs shall be provided to direct pedestrian traffic.

AS105.2 Walkways. A walkway shall be provided for pedestrian travel in front of every construction and demolition site unless the applicable governing authority authorizes the sidewalk to be fenced or closed. Walkways shall be of sufficient width to accommodate the pedestrian traffic, but in no case shall they be less than 4 feet (1219 mm) in width. Walkways shall be provided with a durable walking surface. Walkways shall be accessible in accordance with Chapter 11 of the International Building Code and shall be designed to support all imposed loads and in no case shall the design live load be less than 150 pounds per square foot (psf) (7.2 kN/m2).

AS105.3 Directional barricades. Pedestrian traffic shall be protected by a directional barricade where the walkway extends into the street. The directional barricade shall be of sufficient size and construction to direct vehicular traffic away from the pedestrian path.

AS105.4 Construction railings. Construction railings shall be not less than 42 inches (1067 mm) in height and shall be sufficient to direct pedestrians around construction areas.

AS105.5 Barriers. Barriers shall be not less than 8 feet (2438 mm) in height and shall be placed on the side of the walkway nearest the construction. Barriers shall extend the entire length of the construction site. Openings in such barriers shall be protected by doors that are normally kept closed.

AS105.6 Barrier design. Barriers shall be designed to resist loads required in Chapter 16 unless constructed as follows:

1. Barriers shall be provided with 2-inch by 4-inch (51mm by 102 mm) top and bottom plates.
2. The barrier material shall be boards not less than 3/4-inch (19.1 mm) thick or wood structural panels not less than 1/4-inch (6.4 mm) thick.
3. Wood structural use panels shall be bonded with an adhesive identical to that for exterior wood structural use panels.
4. Wood structural use panels 1/4 inch (6.4 mm) or 5/16 inch (23.8 mm) in thickness shall have studs spaced not more than 2 feet (610 mm) on center (o.c.).
5. Wood structural use panels 3/8 inch (9.5 mm) or 1/2 inch (12.7 mm) in thickness shall have studs spaced not more than 4 feet (1219 mm) on center provided a 2- inch by 4-inch (51 mm by 102 mm) stiffener is placed horizontally at mid height where the stud spacing is greater than 2 feet (610 mm) on center.
6. Wood structural use panels 5/8 inch (15.9 mm) or thicker shall not span over 8 feet (2438 mm).

AS105.7 Covered walkways. Covered walkways shall have a clear height of not less than 8 feet (2438 mm) as measured from the floor surface to the canopy overhead. Adequate lighting shall be provided at all times. Covered walkways shall be designed to support all imposed loads. In no case shall the design live load be less than 150 psf (7.2 kN/m2) for the entire structure.

Exception: Roofs and supporting structures of covered walkways for new, light-frame construction not exceeding two stories above grade plane shall be designed for a live load of 75 psf (3.6kN/m2) or the loads imposed on them, whichever is greater. In lieu of such designs, the roof and supporting structure of a covered walkway shall be constructed as follows:

1. Footings shall be continuous 2-inch by 6-inch (51 mm by 152 mm) members.
2. Posts not less than 4 inches by 6 inches (102 mm by 152 mm) shall be provided on both sides of the roof and spaced not more than 12 feet (3658 mm) on center.
3. Stringers not less than 4 inches by 12 inches (102 mm by 305 mm) shall be placed on edge upon the posts.
4. Joists resting on the stringers shall be not less than 2 inches by 8 inches (51 mm by 203 mm) and shall be spaced not more than 2 feet (610 mm) on center.
5. The deck shall be planks not less than 2 inches (51 mm) thick or wood structural panels with an exterior exposure durability classification not less than 23/32 inch (18.3 mm) thick nailed to the joists.

TABLE AS105
PROTECTION OF PEDESTRIANS

HEIGHT OF CONSTRUCTION	DISTANCE FROM CONSTRUCTION TO LOT LINE	TYPE OF PROTECTION REQUIRED
8 feet or less	Less than 5 feet Construction railings	Less than 5 feet Construction railings
	5 feet or more None	5 feet or more None
More than 8 feet	Less than 5 feet Barrier and covered walkway	Less than 5 feet Barrier and covered walkway
	5 feet or more, but not more than one-fourth the height of construction Barrier and covered walkway	5 feet or more, but not more than one-fourth the height of construction Barrier and covered walkway
	5 feet or more, but between one-fourth and one-half the height of construction Barrier	5 feet or more, but between one-fourth and one-half the height of construction Barrier
	5 feet or more, but exceeding one-half the height of construction None	5 feet or more, but exceeding one-half the height of construction None

For SI: 1 foot = 304.8 mm.

AS105.8 Repair, maintenance and removal. Pedestrian protection required by this appendix shall be maintained in place and kept in good order for the entire length of time pedestrians are subject to being endangered. The owner or the owner's agent, upon the completion of the construction activity, shall immediately remove walkways, debris and other obstructions and leave such public property in as good a condition as it was before such work was commenced.

AS105.9 Adjacent to excavations. Every excavation on a site located 5 feet (1524 mm) or less from the street lot line shall be enclosed with a barrier not less than 6 feet (1829 mm) in height. Where located more than 5 feet (1524 mm) from the street lot line, a barrier shall be erected where required by the building official . Barriers shall be of adequate strength to resist wind pressure as specified in Chapter 3.

SECTION AS106
PROTECTION OF ADJOINING PROPERTY

AS106.1 Protection required. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities. The person making or causing an excavation to be made shall provide written notice to the owners of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.

SECTION AS107
TEMPORARY USE OF STREETS, ALLEYS AND PUBLIC PROPERTY

AS107.1 Storage and handling of materials. The temporary use of streets or public property for the storage or handling of materials or of equipment required for construction or demolition, and the protection provided to the public shall comply with the provisions of the applicable governing authority and this chapter.

AS107.1.1 Obstructions. Construction materials and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, catch basins or manholes, nor shall such material or equipment be located within 20 feet (6096 mm) of a street intersection, or placed so as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.

AS107.2 Utility fixtures. Building materials, fences, sheds or any obstruction of any kind shall not be placed so as to obstruct free approach to any fire hydrant, fire department connection, utility pole, manhole, fire alarm box or catch basin, or so as to interfere with the passage of water in the gutter. Protection against damage shall be provided to such utility fixtures during the progress of the work, but sight of them shall not be obstructed.

SECTION AS108
FIRE EXTINGUISHERS

AS108.1 Where required. All structures under construction, alteration or demolition shall be provided with not less than one approved portable fire extinguisher in accordance with Section 906 of the *International Building Code* and sized for not less than ordinary hazard as follows:

1. At each stairway on all floor levels where combustible materials have accumulated.
2. In every storage and construction shed.
3. Additional portable fire extinguishers shall be provided where special hazards exist, such as the storage and use of flammable and combustible liquids.

AS108.2 Fire hazards. The provisions of this appendix and where applicable the *International Fire Code* shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

SECTION AS109
MEANS OF EGRESS

AS109.1 Maintenance of means of egress. Required means of egress shall be maintained at all times during construction, demolition, remodeling or alterations and additions to any building.

> **Exception:** Existing means of egress need not be maintained where approved temporary means of egress systems and facilities are provided.

SECTION AS110
AUTOMATIC SPRINKLER SYSTEM

AS110.1 Completion before occupancy. In buildings where an automatic sprinkler system is required by this code, it shall be unlawful to occupy any portion of a building or structure until the automatic sprinkler system installation has been tested and approved, except as provided in Section 111.3 of the *International Building Code*.

SECTION AS111
WATER SUPPLY FOR FIRE PROTECTION

AS111.1 Where required. An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible material arrives on the site.

Commenter's Reason: The original proposal is being resubmitted with modifications after a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change.

Section R324 as proposed has been relocated to the scoping portion of Chapter 3 that serves as a sort of road map to IRC technical requirements. Proposed Section R325 and R328 were not included since Appendix G and K address the topics in the proposed section.

Section R326 and R327 were deleted however Appendices R and S were transcribed from IBC chapter 32 and 33 respectively with format modifications to fit the IRC. Additionally, requirements are not applicable to dwellings and townhouses. While reference s made to the IFC and the IBC where necessary, proponents would like to remind the membership that the International family of cods is advertised as a coordinated set of codes designed to work together. So it is very unlikely that the IFC or a fire code is adopted by a jurisdiction using the IRC or IBC.

While the IRC is developed as a standalone code, it does not address certain issues regulated by the International Building Code. This code change provides the IBC regulations by transcription.

Section R301.1.3 is necessary since special inspections and tests may be required by product evaluation reports or due to non-conforming construction that was approved to comply with the IRC and may need to be qualified by testing. For example the use of post installed adhesive or mechanical anchors require special inspections that need to be performed in accordance with the IBC.

Public Comment 2:

Ali M. Fattah, City of San Diego, Development Services Department, representing San Diego Area Chapter ICC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R301.1.4 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction pursuant to a product evaluation report or when required by the Building Official, the tests and inspections shall be performed and documented as is required in Chapter 17 of the *International Building Code*.

R324 Encroachments Into The Public Right-Of- Way. Encroachments into the Public Right-of-Way shall comply with the standards in Chapter 32 of the *International Building Code*.

R325 Safeguards During Construction. Provisions for safety during construction and the protection of adjacent public and private properties shall be governed by the requirements of Chapter 33 of the *International Building Code*.

Commenter's Reason: The original proposal is being replaced after a review of the published REPORT OF THE PUBLIC HEARING. The proponent was not able to attend the Code Development Hearing to explain the proposed code change. We offer this as an option in lieu of transcribing IBC text into the IRC.

Section R324 as proposed has been relocated to scoping portion of Chapter 3 that serves as a sort of road map to IRC technical requirements. Proposed Section R325 and R328 were not included since Appendix G and K address the topics in the proposed section.

Section R324 and R325 were retained in lieu of transcribing IBC chapter 32 and 33 respectively with format modifications to fit the IRC. While this is contrary to the intent of the IRC to function as a standalone code, adoption of the IRC throughout the United States is varying in some cases only the building portions in chapters 1 through 10 are being adopted. Urban jurisdictions enforce the IBC and IFC so when a situation arises it should not be overly difficult to apply the standards of the IBC as applicable when referenced in the IRC. By addressing inadvertent omissions ensures that IRC enforcers who like the IBC more will not tend to consider less restrictive IRC requirements as errors and omissions.

While references are made to the IBC where necessary, proponents would like to remind the membership that the International family of cods is advertised as a coordinated set of codes designed to work together. So it is very unlikely that the IFC or IBC are not adopted by a jurisdiction using the IRC.

RB200-13

Final Action: AS AM AMPC____ D

RB201-13
R324 (New), R202, Chapter 44

Proposed Change as Submitted

Proponent: David P. Kapturowski representing the American Association of Radon Scientist & Technologists

Add new text as follows:

SECTION R324
RADON REDUCTION

R324.1 General. This Section applies to radon control methods for buildings and structures within EPA Radon Zones 1 & 2, as defined in Section R324.42. *Rough-Ins* or complete *Active Soil Depressurization* (ASD) systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor radon levels below the *National Radon Action Level* (NRAL).

R324.2 Mitigation system required. A *mitigation system Rough-In* shall be installed in *dwellings* located in *radon* potential zones 1 and 2 in accordance with Section R324.8. The *radon* potential zones shall be determined in accordance with Section R324.42.

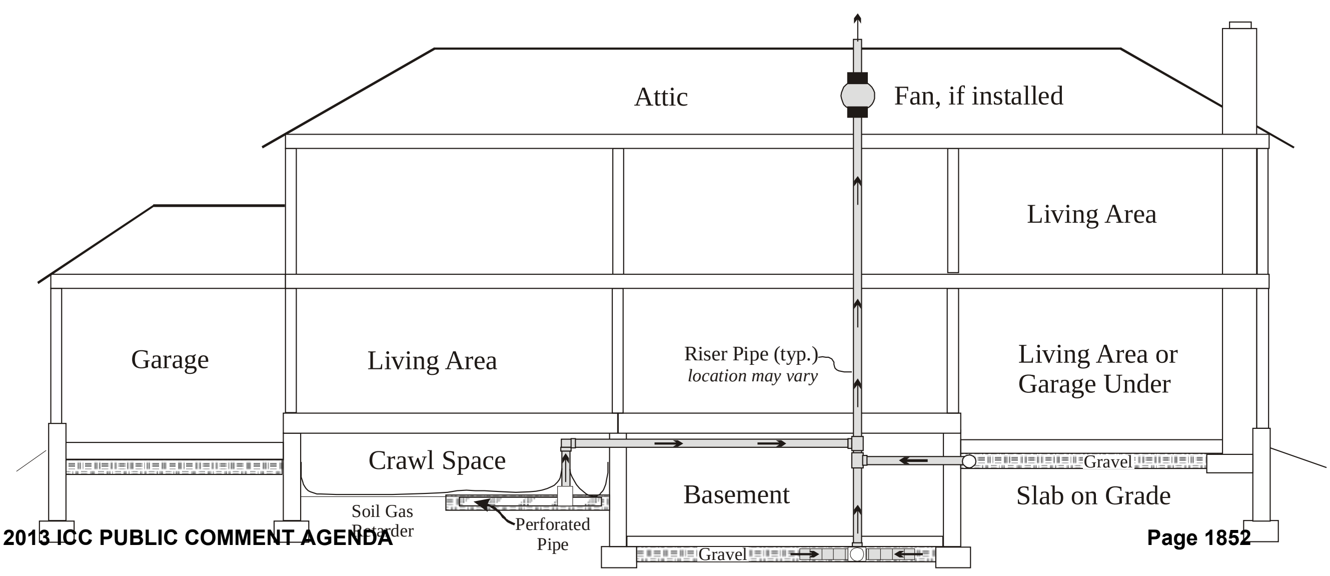
> **Exception:** Where the foundation system does not have any enclosed area of soil contact and where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Action Level* (*NAL*).

R324.3 Design. The design of *radon mitigation systems* shall comply with Section R324 and, for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems.

R324.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

R324.5 Mitigation system rough-in required. The *Rough-In* installation of a *mitigation system* shall be required for all foundations and *combination foundations* types, including *crawl space*, basement, slab-on-grade and slab-on-grade garage located below a living area. The installation shall be in accordance with Sections R324.6 through R324.28. Figure R324.5 illustrates the four foundation types.

FIGURE R324.5
FOUNDATION TYPES



R324.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections R324.7 through R324.9.6.

R324.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections R324.7.1 through R324.7.7 and Section R324.9.

R324.7.1 Soil gas collector. One *soil gas collector* for each *suction point* in accordance with Section R324.7.1.1 shall be installed in accordance with Section R324.7.1.1, R324.7.1.2 or R324.7.1.3.

R324.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

R324.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

R324.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section R324.7.2.1, R324.7.2.2 or R324.7.2.3, as applicable for the type of plenum installed.

R324.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical “up” position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner to facilitate airflow from the collector. One opening of the fitting or device shall be oriented in a vertical “up” position.

R324.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a *gravel soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the *gravel* layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

R324.7.3 Suction points not permitted. *Suction points* are not permitted on sump lids

R324.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

R324.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections R324.7.5.1 through R324.7.5.4.

R324.7.5.1 Sheeting. The *soil gas retarder* membrane shall meet ASTM E1745 Class A, B or C.

R324.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

R324.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.7.7 Membrane label required. *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.8 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections R324.8.1 through R324.9.6.

R324.8.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section R324.8.1.1, R324.8.1.2 or R324.8.1.3.

R324.8.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.8.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1 and surrounding the pipe on at least 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be not less than 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections R324.8.2.1, R324.8.2.2 or R324.8.2.3 as applicable for the type of *soil gas collector* installed.

R324.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel* type *soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the *gravel* layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the *gravel* layer. Said perforated pipe shall provide a not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.2 Geotextile layer soil gas collector. A *suction point* for a geotextile type *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner to maintain airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop* type collector shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section R324.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.3 and served by one or more *suction points*.

R324.8.4 Suction points not permitted. *Suction points* are not permitted on sump lids.

R324.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

R324.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* installed in accordance with Section R324.8.6.1.

R324.8.6.1 Sheeting. Polyethylene sheeting of not less than 6 *mils* [0.152 mm] in thickness, or cross-laminated polyethylene sheeting of not less than 3 *mils* [0.076 mm] in thickness shall be installed on top of the *soil gas collector* and shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections R324.8.6.1.1 through R324.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

R324.11.8.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.11.8.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

R324.11.8.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

R324.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

R324.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

R324.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section R324.8.10.1, R324.8.10.2 or R324.8.10.3.

R324.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

R324.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

R324.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

R324.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections R324.9.1 through R324.9.6.

R324.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid and the lid shall be sealed with a gasket or silicone caulk and mechanically fastened in a manner to facilitate removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or the top course shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted**.** Other penetrations through foundation walls shall be sealed**.**

R324.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

R324.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

R324.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

R324.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

R324.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections R324.11 through R324.19.

R324.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

R324.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

R324.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

> **Exception:** Rigid, non-perforated PVC pipe meeting ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

R324.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that could allow water to collect are prohibited.

R324.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections R324.15.1 and R324.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

R324.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

R324.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

R324.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals of not more than 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals of not more than 10 feet [3048 mm].

R324.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

R324.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

R324.19 Labels required (piping). *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not more than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

R324.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

R324.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such as those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where the *ASD fan* will be installed if required. The space provided for the *ASD fan* shall be located according to Section 901.8. The *ASD* pipe shall be centered in this space.

R324.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

R324.25.1 Label. The over-current device for the branch circuit supplying the *ASD fan* shall be labeled to indicate that it supplies the *radon* fan.

R324.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled as to its purpose.

R324.26 Fan access. Limited *access* shall be provided for each *ASD fan* location to allow installation of *ASD fans* and replacement of same. *Access* entry shall be located not more than 20 feet [6096 mm] from the *ASD fan* location.

R324.27 Radon test kit required. A minimum of one long term *radon*-in-air test kit from a *certified* and/or *licensed* laboratory shall be provided for the occupants of each *dwelling* unit.

R324.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed and activated in accordance with Sections R324.30 through R324.41.

> **Exception:** Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Action Level* (*NAL*) and the *Rough-In* piping is labeled in accordance with Section R324.29.

R324.29 Labels required, system Rough-in. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: **"**This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that is in contrast to the color of the background on which the lettering is applied.

R324.30 Fan selection. Fans installed in the *ASD* system shall be recommended by the manufacturer for *radon* mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or *soil gas* from the fan housing and shall be sized in accordance with Table R324.33 or as specified by a *certified* or *licensed radon mitigator*.

TABLE R324.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	**TOTAL FOUNDATION AREA**		
	Less Than 1600 sq. feet	**1600 to 2500 sq. feet**	**Greater than 2500 sq. feet**
	Less Than 149 sq. meters	**149 to 232 sq. meters**	**Greater than 232 sq. meters**
(3 inch) [76 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 *cfm* @ 0.5 *in. WC* [85m^3/*hr* @ 125 *Pa*]	Use Radon Fan Type: **RF2** RF2 Minimum rating:[a] 75 *cfm* @ 1.0 *in. WC* [127m^3/*hr* @ 250 *Pa*]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*
(4 inch) [102 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 *cfm* @ 0.5 *in. WC* [85m^3/*hr* @ 125 *Pa*]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 *cfm* @ 0.5 *in. WC* [85m^3/*hr* @ 125 *Pa*]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

R324.31 Orientation. *ASD* inline fans shall be installed only on vertical *ASD* piping.

R324.32 Installation. *ASD fans* shall be installed in accordance with the manufacturer's instructions.

R324.33 Flexible connectors required. *ASD fans* shall be connected to the *ASD* piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

R324.34 Fan start-up. *ASD fans* shall be electrically energized upon installation on the *ASD* system piping.

R324.35 Fan location. *ASD fans* shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. *ASD fans* shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in a basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. *ASD fans* shall not be mounted in a location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

R324.36 System monitor required. Each *ASD* system shall be provided with a system negative pressure monitor, such as, but not limited to, manometer type pressure gauges, to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

R324.37 Startup marking. *ASD* system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

R324.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

R324.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies. and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

R324.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or approved equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.40 Documentation package. The occupants of the *dwelling* shall be provided with a documentation package that includes the following:

1. A description of system operation, such as shown in Exhibit 1 "Understanding a Radon Reduction System".
2. All *radon* test data for the property.
3. The annual energy consumption of the installed *ASD fan*(s), whether estimated or actual, and the projected monetary cost of such energy.

R324.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy and shall be performed by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NAL*, a *certified* and/or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NAL* are achieved.

R324.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure R324.42 or from Table R324.42. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure R324.42 and Table R324.42.

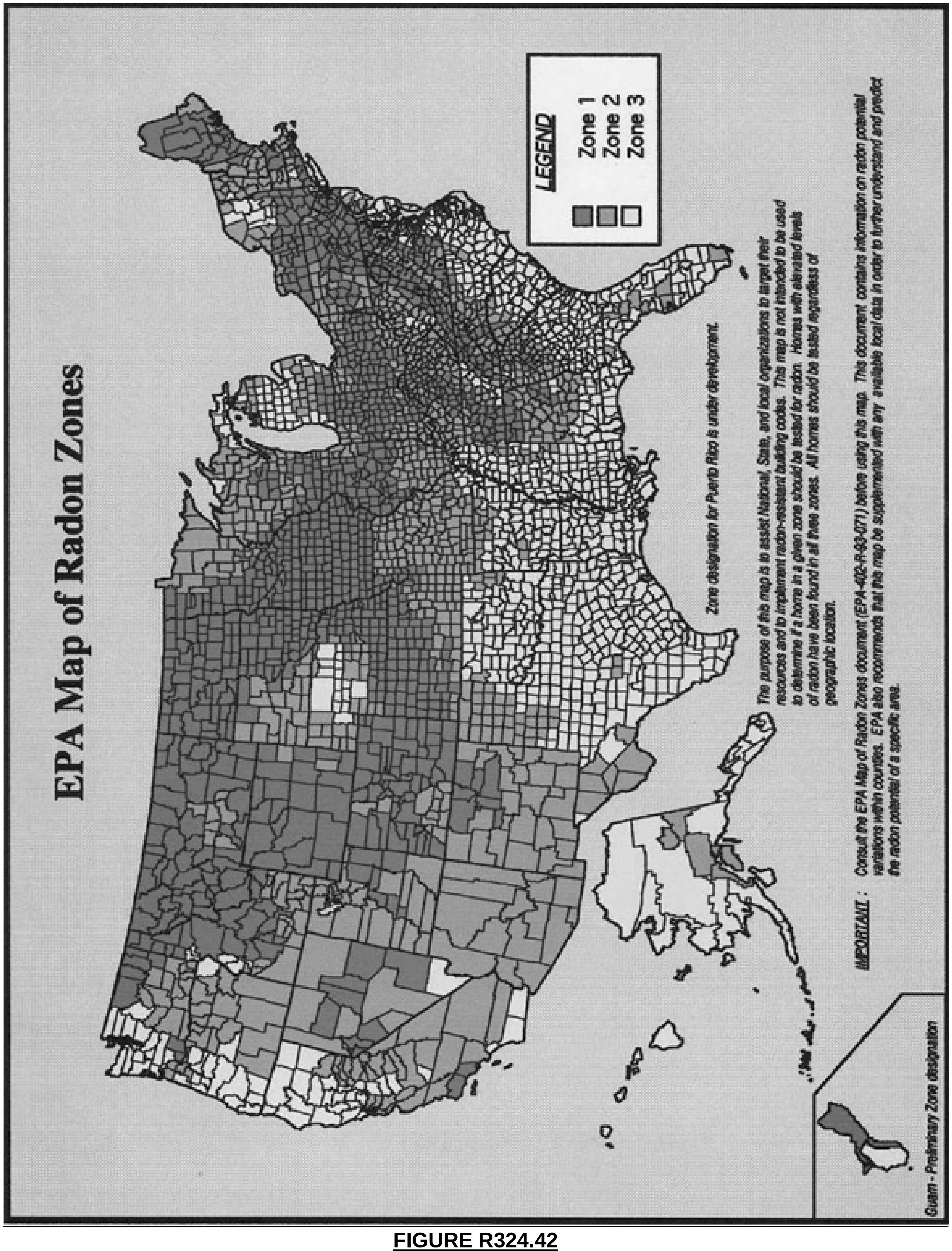


FIGURE R324.42
RADON POTENTIAL ZONES MAP
TABLE R324.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage
Municipality
Dillingham
Census Area
Fairbanks
North Star
Borough
Kenai
Peninsula
Borough
Matanuska-
Susitna
Borough
Southeast
Fairbanks
Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independenc
e
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa
Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra
Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San
Bernardino
San
Francisco
San Luis
Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London
Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None----
-

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary

Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattami
e
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington

Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry

Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorenc
y
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault
Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow
Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape
Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste
Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and
Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder
River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden
Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon

Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York

Zone 2

Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1

Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2

Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1

Carroll

Zone 2

Belknap
Cheshire
Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1

Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2

Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1

Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2

Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1

Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2

Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1

Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

Zone 2

Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1

Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1

Adams
Allen
Ashland
Auglaize

Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2
Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry

Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe
Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima
West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield

Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

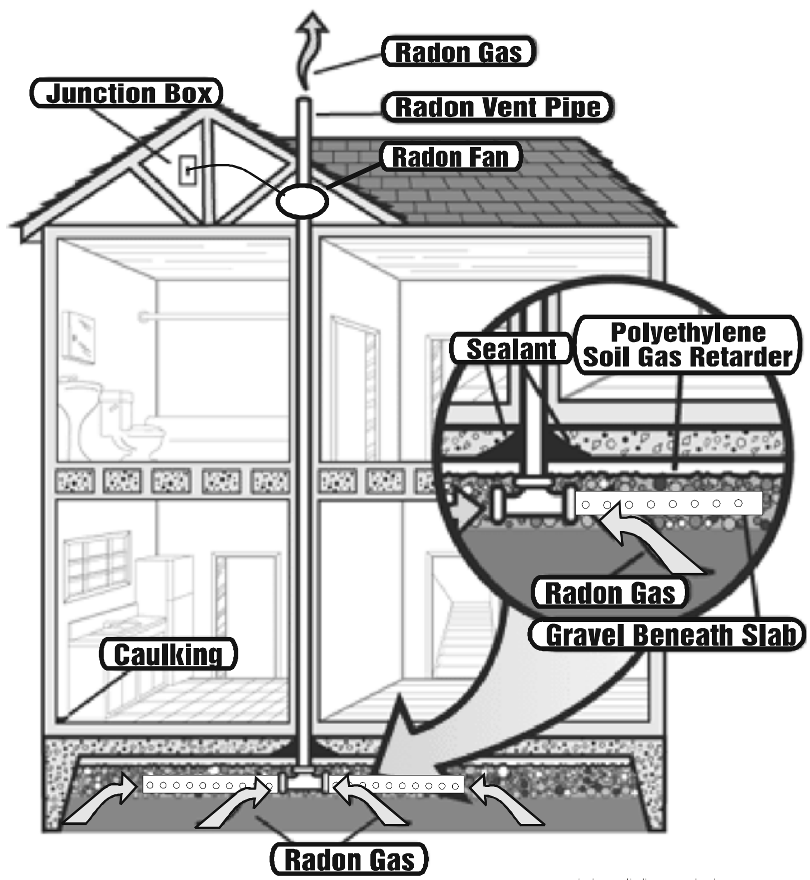
Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

R324.46

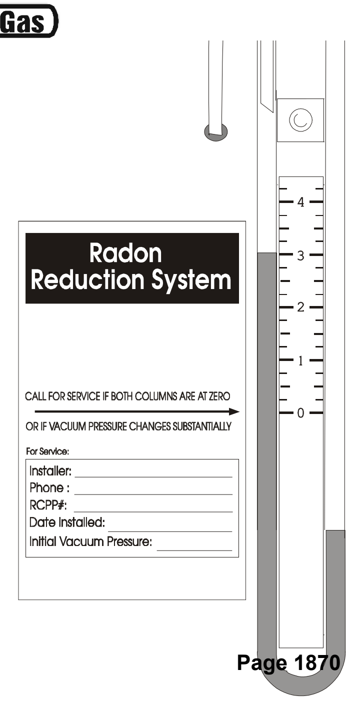
Exhibit 1 - Understanding a Radon Reduction System (Occupants)

General: *Radon* is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock and water and gets into the air you breathe. The *radon* potential of any specific building lot is dependent on whether there is sufficient *radon* source material in the ground below the home and sufficient upward air movement for the *radon* to be near your home's foundation. *Radon* typically moves up through the ground to the air above and into your home through gaps and other holes in the foundation. The primary health concern associated with *radon* is lung cancer. The Environmental Protection Agency (EPA) estimates that 21,000 people die in the US each year from *radon*-induced lung cancer.



Radon Reduction System: Your new home was constructed with an *Active Subslab Depressurization* (*ASD*) System to protect your family's health. The *ASD* system is designed to limit *radon* entry into your home by keeping the soil under your home at a lower pressure than the air in your home. In doing so, *radon* and other *soil gases* from below your home are exhausted above your roof through a specially designed *radon* fan. An *ASD* system is recognized by the EPA as the Best Available Technology for *radon* control because it keeps much of the *radon* from entering your home. The system is designed to run 24 hours a day, 7 days a week. The electrical power required to run the fan, which is the only active component in the system, will typically cost 5 to 25 cents per day depending upon the type of fan and your electrical utility rates. Cost to operate this fan would be less than operating a normal light bulb.

System Maintenance: Your *ASD* System is designed to provide many years of service under normal conditions without significant maintenance. As the occupant of this home, you need to routinely check the system pressure gauge or other system monitor to verify that the fan is operating correctly. There are various labeled components of your *radon* system such as pipe, crawlspace membrane, fan, system pressure monitor and sump basin. DO NOT ALTER OR DISCONNECT any of these components. If the sump basin is opened for required maintenance or repair, restore to the original condition immediately after completing work. You also need to be aware that foundation settling, renovations or additions to your home can change your indoor *radon* concentrations. A *certified/licensed radon mitigator* can provide guidance when changes are to be made to the *dwelling* or provide a routine check-up on the operation of the system.



Understanding the System Pressure Gauge: The pressure gauge shown on the right is typical of a gauge used to monitor the pressure developed in the piping system by the *radon* fan. Your fan pressure should be checked regularly to ensure the fan system continues to operate properly. This gauge measures pressure in Inches Water Column (*in. WC*). This gauge does NOT measure *radon*.

Call for service if the measure changes substantially (20% or more) or if the gauge reads zero pressure (both columns equal).

Your *ASD* system may have an audible alarm to alert you to call for service in the event of a problem.

Radon Testing: Your builder left behind a long term test kit for you to use to test your home after you move in. The way you and your family live in your new home, how you set heating and cooling controls or use your clothes dryer and other exhaust fans can affect indoor *radon* levels. It is recommended that you test for a minimum of 3 months or preferably longer to determine your actual *radon* exposure in the home. Be sure to check the warranty your builder provides to make certain you complete your testing before the end of the new home warranty period.
Follow the instructions provided by the test laboratory to open, activate and place the test kit to test your *radon* levels.

The USEPA recommends that you retest your home at least every 2 years or if major renovations or additions are made to the *dwelling*.

Other sources of radon: *Radon* can also be found in the water from private wells. Testing can determine if your well contains significant amounts of *radon*.

More Info: For more information on *radon*, *radon* testing or *radon* removal: **www.epa.gov/radon**

NOTE: Exhibit 1 may be reprinted without license.

Add definitions as follows:

R202
DEFINITIONS

ACCESS (limited). For the purposes of Section R324, the point of entry to fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. A mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. For the purposes of Section R324, procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, "egg crate" support of a fabric enclosure or similar means. Also referred to as "Vent Strip".

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement and/or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purposes of Section R324, a *certified/licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. For the purposes of Section R324, any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NAL* is defined as the US Environmental Protection Agency's Action Level of 4 *pCi/L* [148 Bq/m^3].

PIPE LOOP. A continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purposes of Section R324, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.

SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purposes of Section R324, the location where the *soil gas collector* is connected to the *ASD* system piping.

Add standards to Chapter 44 as follows:

ASTM

D5926-11 "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "

E1745-11 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Reason: 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 & 2. Application of the methods contained in this proposed code change will ensure all new homes built in radon zones 1 & 2 will be tested to be below the EPA Action Level of 4 pCi/L prior to occupancy.

The code change proposal presented herein was developed as an ANSI consensus standard by the AARST Radon Standards Consortium. This standard, AARST/ANSI #CCAH *"Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses,"* was produced by a committee of (27) representing radon professionals, home inspectors, home builders, architects, code officials, consumer advocates and state and federal government.

There is no requirement in the Residential Code to apply radon reduction methods to new construction and thereby prevent elevated radon concentrations in newly built homes. Appendix F of the IRC (Radon Control Methods) is inadequate, 20 years old and not a mandatory part of the building code unless voluntarily adopted by a local jurisdiction.

This proposal adds requirements to homes in the high risk radon counties. Like snow and wind load, seismic and flood-resistance provisions, this proposal targets requirements to the areas with the greatest likelihood of exposure. The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction. Most homes can be built with only a mitigation system rough-in. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system rough-in (passive) =$296*

Cost of fan driven mitigation system = $707* (total cost, not in addition to $296)

Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

Analysis: A review of the standards proposed for inclusion in the code, [ASTM D5926-11 and ASTM E1745-11] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

R324 (NEW)-RB-KAPTUROWSKI

Committee Action Hearing Results

For staff analysis of the content of ASTM D5926 and ASTM E1745 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because they felt that information related to radon gas should remain in the appendix, and because what may sometimes be needed should not always be required. This can be done independently at the local level. There are other ways to mitigate radon. An educational brochure seems to be included in the proposal, which is not appropriate for the code. It is not clear why a certified third party is required. The proposal requires a performance standard on top of prescriptive requirements with no guarantee that the performance requirements will be met. This committee and building and building code professionals are not industrial hygienists and should not be expected to enforce health related requirements.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

David Kapturowski, Spruce Environmental Technologies, Inc, representing American Association of Radon Scientists and Technologists (AARST), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION R324
RADON REDUCTION

R324.1 General. This Section applies to *radon* control methods for buildings and structures within EPA *radon* zones 1 & 2, as defined in Section R324.42. *Rough-Ins* or complete *Active Soil Depressurization (ASD)* systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor *radon* levels below the *National Radon Action Level (NRAL*).

R324.2 Mitigation system required. A *mitigation system Rough-In* shall be installed in dwellings located in *radon* potential zones 1 and 2 in accordance with Section R324.5. The *radon* potential zones shall be determined in accordance with Section R324.42.

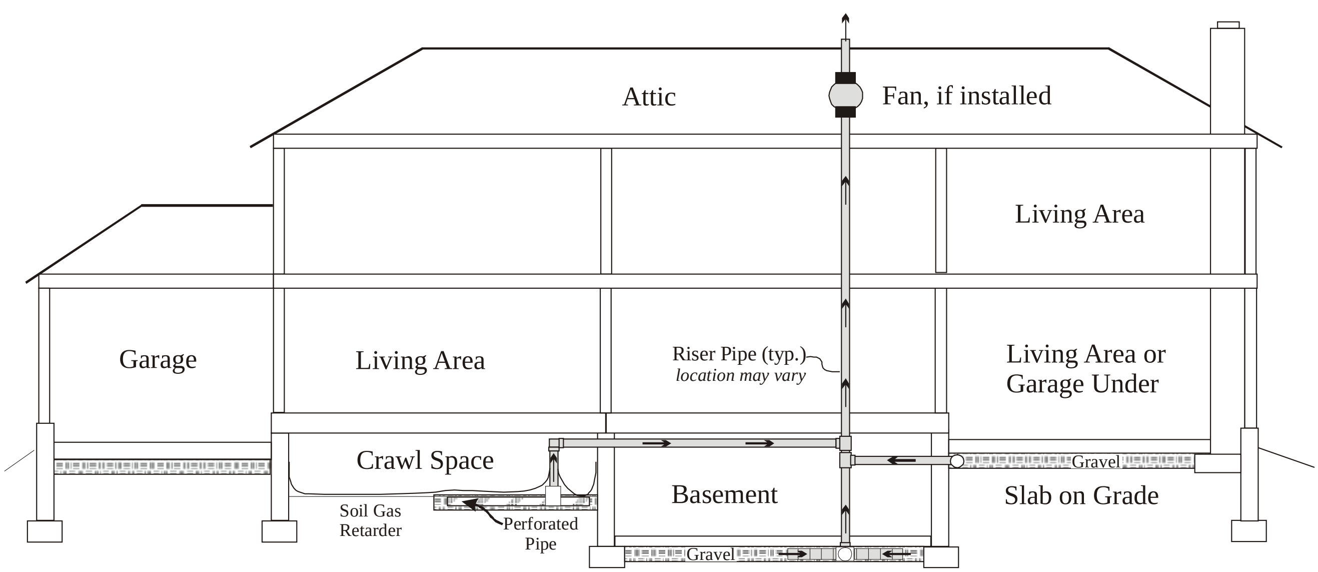
> **Exception:** Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*).

R324.3 Design. The design of *radon mitigation systems* shall comply with Section R324 and for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems.

R324.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

R324.5 Mitigation system rough-in required. The *Rough-In* installation of a *mitigation system* shall be required for all foundations and combination foundations types, including crawl space, basement, slab-on-grade and slab-on-grade garage located below a living area. The installation shall be in accordance with Sections R324.6 through R324.28. Figure R324.5 illustrates the four foundation types.

FIGURE R324.5
FOUNDATION TYPES



R324.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections R324.7 through R324.9.6.

R324.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections R324.7.1 through R324.7.7 and Section R324.9.

R324.7.1 Soil gas collector. One *soil gas collector* for each *suction point* (R324.7.2) shall be installed in accordance with Section R324.7.1.1, R324.7.1.2 or R324.7.1.3.

R324.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

R324.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

R324.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section R324.7.2.1, R324.7.2.2 or R324.7.2.3, as applicable for the type of plenum installed.

R324.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical "up" position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner that facilitates airflow from the collector. One opening of the fitting or device shall be oriented in a vertical "up" position.

R324.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a gravel *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

R324.7.3 Suction points not permitted. *Suction points* shall not be permitted on sump lids

R324.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

R324.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections R324.7.5.1 through R324.7.5.4.

R324.7.5.1 Sheeting. The *soil gas retarder* membrane shall comply with ASTM E1745 Class A, B or C.

R324.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

R324.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.7.7 Label required (membranes). *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.8.1 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections R324.8.1.1 through R324.9.6.

R324.8.1.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section R324.8.1.1.1, R324.8.1.1.2 or R324.8.1.1.3.

R324.8.1.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.8.1.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.1.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 and surrounding the pipe on at least 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be at least 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections R324.8.2.1, R324.8.2.2 or R324.8.2.3 as applicable for the type of *soil gas collector* installed.

R324.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel* type *soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the gravel layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Said perforated pipe shall provide a minimum of 1 square inch [645 sq. mm] of open perforation area in each lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.2 Geotextile layer soil gas collector. A *suction point* for a geotextile type *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner that maintains airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop* type collector shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section R324.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.8.4 Suction points not permitted. *Suction points* shall not be permitted on sump lids.

R324.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

R324.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* that is installed in accordance with Section R324.8.6.1.

R324.8.6.1 Sheeting. Polyethylene sheeting of not less than 6 *mils* [0.152 mm] in thickness, or cross-laminated polyethylene sheeting of not less than 3 *mils* [0.076 mm] in thickness shall be installed on top of the *soil gas collector* and shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections R324.8.6.1.1 through R324.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

R324.8.6.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.6.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

R324.8.6.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

R324.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

R324.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

R324.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section R324.8.10.1, R324.8.10.2 or R324.8.10.3.

R324.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

R324.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

R324.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

R324.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections R324.9.1 through R324.9.6.

R324.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid and the lid shall be sealed with a gasket or silicone caulk and mechanically fastened in a manner that facilitates removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted**.** Other penetrations through foundation walls shall be sealed**.**

R324.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

R324.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

R324.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

R324.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

R324.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections R324.11 through R324.19.

R324.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

R324.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

R324.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

Exception: Rigid, non-perforated PVC pipe complying with ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

R324.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that allow water to collect shall be prohibited.

R324.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections R324.15.1 and R324.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

R324.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

R324.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

R324.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals not exceeding 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals not exceeding 10 feet [3048 mm].

R324.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

R324.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

R324.19 Piping labels required. *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not greater than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering height shall be not less than 1/4 inch [6.35 mm] and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

R324.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

R324.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such as those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where a required *ASD fan* is installed. The space provided for the *ASD fan* shall be located in accordance with Section R324.35. The *ASD* pipe shall be centered in this space.

R324.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

R324.25.1 Label. The over-current device for the branch circuit supplying the *ASD fan* shall be labeled to indicate that it supplies the *radon* fan.

R324.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled to indicate its purpose.

R324.26 Fan access. Limited *access* shall be provided for each *ASD fan* location to allow installation and replacement of *the fan*. *Access* entry shall be located not greater than 20 feet [6096 mm] from the *ASD fan* location.

R324.27 Radon test kit required. A minimum of one long term *radon*-in-air test kit from a *certified* or *licensed* laboratory shall be provided for the occupants of each dwelling unit.

R324.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed by a *certified* or *licensed radon mitigator* and activated in accordance with Sections R324.30 through R324.40.

> **Exception:** Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*) and the *Rough-In* piping is labeled in accordance with Section R324.29.

R324.29 Labels required, system *Rough-In*. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: **"**This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that is in contrast to the color of the background on which the lettering is applied.

R324.30 Fan selection. Fans installed in the *ASD* system shall be recommended by the manufacturer for *radon* mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or *soil gas* from the fan housing and shall be sized in accordance with Table R324.33 or as specified by a *certified* or *licensed radon mitigator*.

TABLE R324.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	TOTAL FOUNDATION AREA		
	Less Than 1600 sq. feet	**1600 to 2500 sq. feet**	**Greater than 2500 sq. feet**
	Less Than 149 sq. meters	**149 to 232 sq. meters**	**Greater than 232 sq. meters**
(3 inch) [76 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF2** RF2 Minimum rating:[a] 75 cfm @ 1.0 in. WC [127m^3/hr @ 250 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*
(4 inch) [102 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

R324.31 Orientation. *ASD* inline fans shall be installed only on vertical *ASD* piping.

R324.32 Installation. *ASD fans* shall be installed in accordance with the manufacturer's instructions.

R324.33 Flexible connectors required. *ASD fans* shall be connected to the *ASD* piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

R324.34 Fan start-up. *ASD fans* shall be electrically energized upon installation on the *ASD* system piping.

R324.35 Fan location. *ASD fans* shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. *ASD fans* shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. *ASD fans* shall not be mounted in any location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

R324.36 System monitor required. Each *ASD* system shall be provided with a system negative pressure monitor such as, but not limited to, a manometer type pressure gauge to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

R324.37 Startup marking. *ASD* system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

R324.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

R324.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that is in contrast with the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies. and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

R324.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that is in contrast with the color of the background on which the lettering is applied.

R324.40 Documentation package. The occupants of the dwelling shall be provided with a documentation package that includes the following:

1. A description of system operation.
2. All *radon* test data for the property performed by a *licensed or certified* measurement professional.
3. The annual energy consumption of the installed *ASD fan*(s), whether estimated or actual, and the projected monetary cost of such energy.

R324.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy and shall be performed by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NRAL*, a *certified* and/or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NRAL* are achieved.

R324.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure R324.42 or from Table R324.42 except that, where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure R324.42 and Table R324.42.

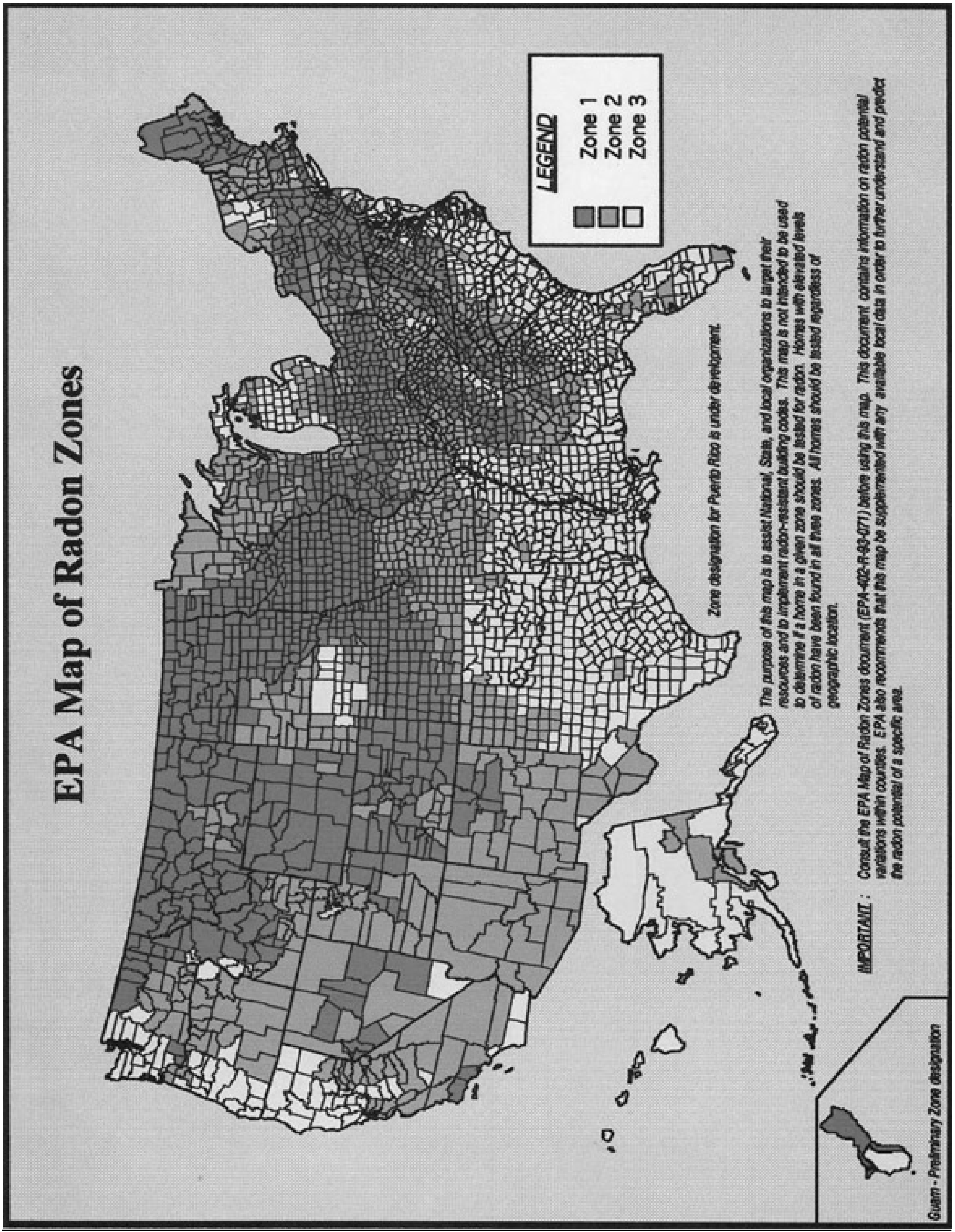


FIGURE R324.42
RADON POTENTIAL ZONES MAP

TABLE R324.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage Municipality
Dillingham Census Area
Fairbanks North Star Borough
Kenai Peninsula Borough
Matanuska-Susitna Borough
Southeast Fairbanks Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independence
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San Bernardino
San Francisco
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London

Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None-----

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattamie
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington
Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry
Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorency
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York

Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire

Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2

Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe
Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield
Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

Add to Chapter 3 Bibliography

ASTM D5926-11 – "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "

ASTM E1745-11 – "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Add new definitions as follows:

ACCESS (limited). For the purposes of Section R324, the point of entry to a fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals shall be those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. For the purposes of Section R324, a mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. For the purposes of Section R324, procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, "egg crate" support of a fabric enclosure or similar means. Also referred to as "Vent Strip".

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement and/or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purposes of Section R324, a *certified/licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. For the purposes of Section R324, any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NRAL* is defined as the US Environmental Protection Agency's Action Level of 4 *pCi/L* [148 Bq/m^3].

PIPE LOOP. For the purposes of Section R324, a continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purposes of Section R324, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.

SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purposes of Section R324, the location where the *soil gas collector* is connected to the *ASD* system piping.

Commenter's Reason: Exhibit 1 was deleted from the original proposal because the committee felt it was not appropriate for code. The Exception in R324.2 was modified to allow for alternate radon mitigation techniques and provides a performance only path. The Exception in R324.2 also provides the opportunity to not require a system where local conditions determine it is not necessary. In the prescriptive path where a complete Active Soil Depressurization system is installed the builder will not be required to test prior to occupancy.

This proposed section on radon reduction is consistent with the stated goals of the IRC as stated in **R103.1 Intent: "***The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare…………".* The prescriptive requirements of this proposed section and the requirements for certified/licensed radon professionals relieves the building official from a need for detailed knowledge on testing and remediating this Class "A" carcinogen from the built environment and so they need not be an industrial hygienist or an expert on radon.

Radon is a Life/Safety issue which exists in residential construction because of the way homes are constructed and the soil underlying a dwelling's foundation. 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 and 2. If the radon system is not needed it does not need to be roughed-in or completed.

There is currently no requirement in the Residential Code to apply radon reduction methods to new construction and thereby prevent elevated radon concentrations in newly built homes unless voluntarily adopted by a local jurisdiction. Because of the lack of code requirement we have added 2.5 million new homes with elevated indoor radon to the country's housing inventory in the past 25 years.

The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

This change proposal will slightly increase the cost of construction. Most homes can be built with only a mitigation system Rough-In. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system Rough-In (passive) =$296*

Cost of fan driven mitigation system = $707* (total cost, not in addition to $296)

Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

Public Comment 2:

Mathew Koch, Southern Radon Reduction, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

SECTION R324
RADON

R324.1 *Radon* Testing. Where a building site indicates a potential for elevated indoor *radon* concentrations, as shown by the United States Environmental Protection Agency Zones 1 and 2 in Figure 324.1 or from the United States Environmental Protection Agency *radon* potential by county listing in Table 324.2, the *building official* shall determine whether to require a *radon* test be performed by a *licensed or certified radon* measurement professional prior to occupancy. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure 324.1 and Table 324.2.

Add new definitions as follows:

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program and the National Radon Safety Board. Also see LICENSED.

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

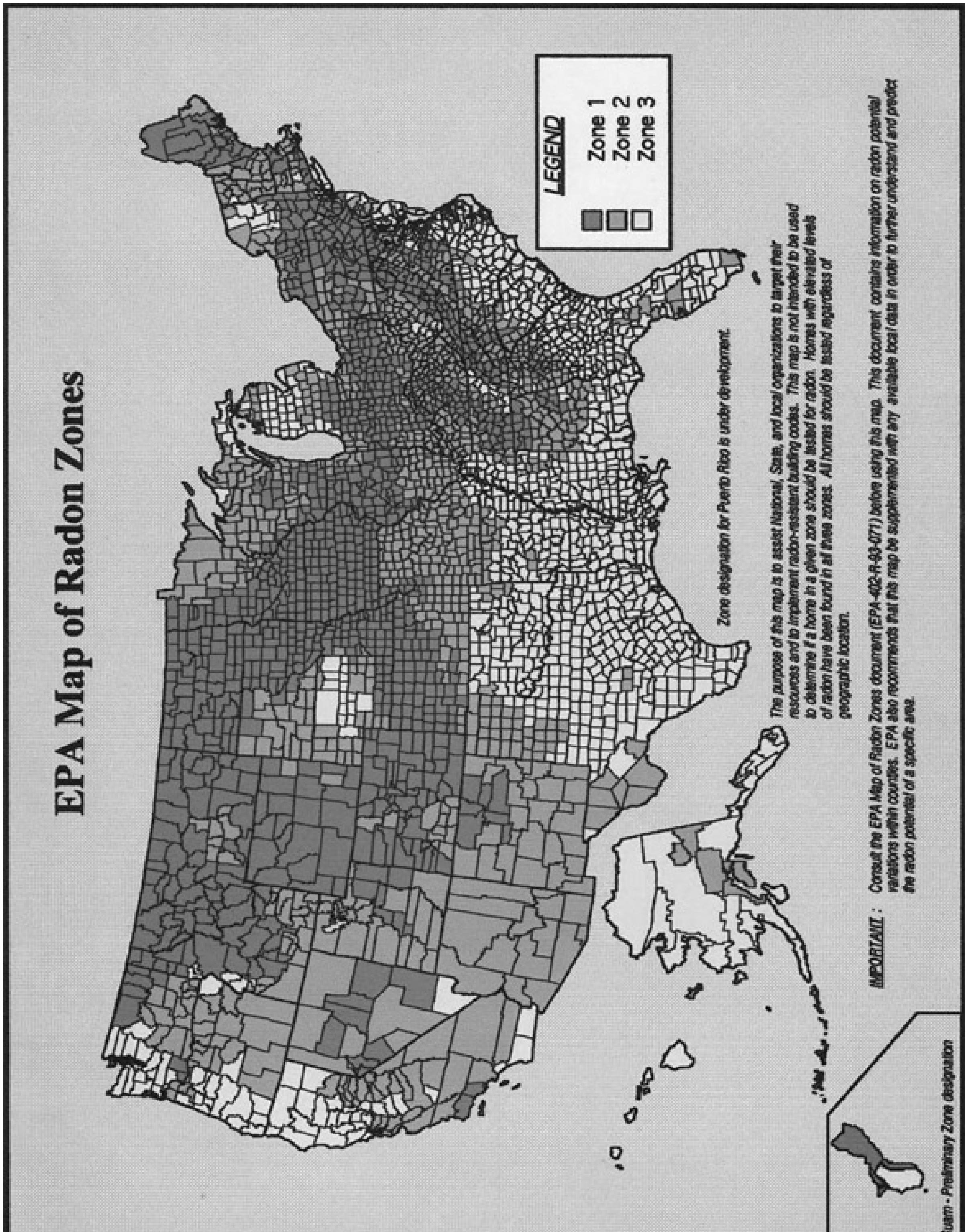


FIGURE R324.2
RADON POTENTIAL ZONES MAP

TABLE R324.2 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage Municipality
Dillingham Census Area
Fairbanks North Star Borough
Kenai Peninsula Borough
Matanuska-Susitna Borough
Southeast Fairbanks Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independence
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San Bernardino
San Francisco
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London
Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None-----

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattamie
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington
Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry
Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorency
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York

Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire

Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union
Valencia

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga
Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2

Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe

Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield
Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

--------end-------

Commenter's Reason: The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code to identify homes with excessive levels of this Class "A" carcinogen.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction by adding a radon test if required by the building official.

Cost of radon test =$125

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

RB201-13

Final Action: AS AM AMPC____ D

RB203-13
R202, R301.2.2.3.1, R324 (New)

Proposed Change as Submitted

Proponent: Maureen Traxler/City of Seattle/Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

SECTION R202
DEFINITIONS

MEZZANINE~~, LOFT~~. An intermediate level or levels between the floor and ceiling of any *story* ~~with an aggregate floor area of not more than one-third of the area of the room or space in which the level or levels are located~~.

Revise as follows:

R301.2.2.3.1 Height limitations. Wood-framed buildings shall be limited to three stories above *grade* plane or the limits given in Table R602.10.3(3). Cold-formed, steel-framed buildings shall be limited to less than or equal to three stories above *grade* plane in accordance with AISI S230. Mezzanines as defined in Section R202 that comply with Section R324 shall not be considered as stories. Structural insulated panel buildings shall be limited to two stories above *grade* plane.

SECTION R324
MEZZANINES

R324.1 General. *Mezzanines* shall comply with Section R324.

R324.2 Mezzanines. The clear height above and below *mezzanine* floor construction shall be not less than 7 feet (2134 mm).

R324.3 Area limitation. The aggregate area of a *mezzanine or mezzanines* shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located.

R324.4 Means of egress. The *means of egress* for *mezzanines* shall comply with the applicable provisions of Section R311.

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they *are* located except for walls not more than 42 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with NFPA 13R, NFPA 13D or Appendix S, a *mezzanine* having two or more *means of egress* shall not be required to be open to the room in which the *mezzanine* is located.

Reason: The IRC provisions for mezzanines are incomplete. The code provides a definition of "mezzanine, loft" but doesn't include any other provisions to clarify the allowable size or extent of mezzanines. This proposal copies relevant portions of IBC Section 505.2 into the IRC.

Mezzanines are allowed to be considered not to be stories because they are limited in size and because they are subject to provisions that provide protection from fire hazards. Mezzanines are required to be open to the room in which they are located, which provides early warning to occupants should a fire occur in either the mezzanine or in the room. The IBC provisions also include more specific provisions for determining the portion of the room that can be included in the allowable area of the mezzanine.

There is also reason to limit the size of mezzanines. Section R301.2.2.3.1 states that mezzanines are not considered stories in the context of height limitations for buildings in higher seismic design categories. Mezzanines that are large in relation to the size of the story will act more like a story in response to seismic forces and should be treated as stories.

In addition, we are proposing to delete the word "loft" from the definition of mezzanine. The word is not used anywhere in the code, so it is not necessary to define it.

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

R324 (NEW)-RB-TRAXLER

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify proposal as follows:

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they *are* located except for walls not more than ~~42~~ 36 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with ~~NFPA 13R, NFPA 13D or Appendix S~~ Section R313, a *mezzanine* ~~having two or more *means of egress*~~ shall not be required to be open to the room in which the *mezzanine* is located.

(Portions of proposal not shown to remain as originally proposed.)

Committee Reason: The committee approved this code change proposal because they felt that it appropriately removes requirement s that should be in the body of the code from the definitions section of the code. The term "loft" does not add anything. The modification adds clarity.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Homer Maiel, PE, CBO, City of Palo Alto/4LEAF Inc., representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they *are* located except for walls not more than ~~42~~ 36 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two stories above grade plane and equipped throughout with an automatic sprinkler system in accordance with NFPA 13R, NFPA 13D or Appendix S Section R313, a mezzanine having two or more means of egress shall not be required to be open to the room in which the mezzanine is located.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The committee voted to modify the original proposal. We agree with the original proposal and the modifications made by the committee with the one exception of the allowable wall height. The wall height was modified from 42 inch to 36 inch maximum height by the committee. The current code and original proposal permits up to a 42-inch high wall enclosure to qualify as open for purposes of establishing a mezzanine. The modification from 42 to 36 inch was probably done to correlate with the guard height requirements. The 36-inch is a minimum height for guards. One should not be penalized for installing a guard taller than the minimum...and arguably, safer.

RB203-13

Final Action: AS AM AMPC____ D

RB206-13
R401.5 (New)

Proposed Change as Submitted

Proponent: Jonathan Siu, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

Add new text as follows:

<u>**R401.5 Protection of adjoining property.** Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights, roofs and other building elements. Provisions shall be made to control water runoff and erosion during construction or demolition activities.</u>

Reason: Currently, the IRC contains no provisions requiring adjacent property be protected from construction activities. This proposal brings text from IBC Section 3307 (Protection of Adjoining Property) into the IRC, bringing the codes into closer alignment. One difference between this proposal and the IBC text is the addition of "and other building elements" in the second sentence. The WABO TCD Committee feels it is just as important to protect elements such as bay or garden windows with roof-like components from hazards as it is to protect roofs and skylights.

It is to be noted that there is a requirement in the IBC text to notify owners of adjoining buildings at least 10 days prior to the start of excavation. The WABO TCD Committee considers this to be unenforceable language, and therefore has not included it in this proposal. However, if the committee feels led to do so, the following text (verbatim from IBC Section 3307.1) can be added to the proposal as a committee modification, in order to get complete consistency between the codes:

"<u>The person making or causing an excavation to be made shall provide written notice to the *owners* of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.</u>"

Cost Impact: Potential increase in initial cost of construction since this is not currently specifically regulated in the code, but may reduce potential for lawsuits where precautions are not already being taken.

R401.5 (NEW) #1-RB-SIU.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The building department is not involved with encroachment on adjacent property. There are local, state and federal laws that address this issue. This is consistent with the committees action on RB205-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R401.5 Protection of adjoining property. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights, roofs and other building elements. ~~Provisions shall be made to control water runoff and erosion during construction or demolition activities.~~

Commenter's Reason: This proposal simply aligns the IRC more closely with the IBC. The recent tragedy in Philadelphia demonstrates the need for this type of regulation. The modification is being proposed in response to the comments received at the Committee Action Hearings stating drainage issues are not handled by the Building Official, although it is notable that the identical text appears in the IBC, as stated below. In further response to the published and unpublished comments received at the hearings:

1. The first published reason for the Committee's action is that the building department is not involved with encroachment on adjacent property. However, the proposed text is contained in Section 3307.1 of the 2012 IBC (reproduced below for reference), including the text regarding the control of water runoff and erosion. There were no proposals in Group A to change that section, so the identical text will appear in the 2015 IBC. Therefore, we would contend the building department is already involved in these types of issues.
2. One commenter said this is handled by local ordinances, a statement that is echoed in the published reason for the Committee's disapproval. However, not all jurisdictions pass local ordinances to deal with this type of issue, and some jurisdictions are prohibited from amending the IRC. The I-codes form a family of <u>model</u> codes. As such, this text provides model code language that jurisdictions can adopt to protect neighboring properties. These may be especially helpful to those jurisdictions who are restricted from adopting amendments to the model code. For those jurisdictions who have already adopted local ordinances, this text can serve either to refine their current regulations, or eliminate the need to adopt a separate local ordinance.
3. One commenter said these provisions were "best practice," not minimum code. Similar to the first response above, since similar text appears in the IBC, it does not appear to be a "best-practice," but was considered to be minimum code for other types of buildings, and should be applicable to IRC-scope buildings as well.

2012 IBC Section 3307.1, with text extracted for the original proposal underlined:

3307.1 Protection required. <u>Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities.</u> The person making or causing an excavation to be made shall provide written notice to the *owners* of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.

RB206-13

Final Action: AS AM AMPC____ D

RB207-13
R401.5 (New), R403.1, Chapter 44

Proposed Change as Submitted

Proponent: Jonathan Siu, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

Revise as follows:

R401.5 Site work. Site work shall be performed in accordance with Sections R401.5.1 through R401.5.4.

R401.5.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Excavation, fill, or shoring, whether temporary or permanent, shall not extend onto adjacent property. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

R401.5.2 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the submittal of a geotechnical report acceptable to the *building official*.

R401.5.3 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure, or caused to be imposed on them, unless such building or structure is designed to resist the additional loads caused by the fill or surcharge.

R401.5.4 Soil supporting foundations. Footings and foundations shall be supported on undisturbed natural soils or engineered fill. Fill to be used to support the footings or foundations of any building or structure shall comply with the provisions of a geotechnical report acceptable to the *building official*. The compaction shall be verified by a *registered design professional*.

> **Exception:** Compacted fill material 12 inches (305 mm) in depth or less need not comply with a geotechnical report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557, and the compaction is verified by a *registered design professional*.

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. ~~Footings shall be supported on undisturbed natural soils or engineered fill.~~ Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

Add new standard to Chapter 44 as follows:

ASTM

D 1557-07 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft3 (2,700 KN m/m3)]

Reason: This proposal adds provisions to the IRC to protect adjacent structures and property from the effects of site work. Currently, there are no regulations in the IRC that would prevent an excavation for a foundation or footing from endangering adjacent buildings or property, nor is guidance given for fill material properties. An extreme example of where this was a problem was the collapse of the Lotus Riverside apartment building in Shanghai in 2009. There, the contractor stockpiled up to 10 meters of soil on one side of the building, while excavating on the other, leading to the building tipping over (see http://www.chinadaily.com.cn/china/2009-07/03/content_8376126.htm). For IRC-type buildings, the failures would not be as dramatic, but can still become a headache for the building official. This proposal is based on text found in IBC Section 3304, which would bring the two codes into closer alignment. Specifically:

R401.5.1 – Requires excavations or fill not endanger (undercut or overhang) adjacent buildings or property. It also clearly states that all site work (temporary or permanent) has to stay within the property lines—a principle that is understood by most people, but not stated anywhere in the I-codes. This does not preclude other approved alternates, such as a temporary easement, from being employed to allow work to extend onto the adjacent property, since those can be approved under Section R104.11. Finally, this section states that any footings or foundations that are undercut by an adjacent excavation must be underpinned or supported by other means. If the affected foundation is on the adjacent property, the shoring or permanent foundation wall being constructed must be designed for the appropriate surcharge to support the adjacent foundation. (See also proposed Section R401.5.3.)

R401.5.2 – Sets some practical limits on permanent cut or fill slopes. A geotechnical report (usually by a geotechnical engineer) can set different parameters, but the text gives the building official the opportunity to review the report to see if the recommendations are based on an appropriate investigation.

R401.5.3 – Requires structures supporting surcharge loads to be designed for those loads. Examples of sources of surcharge loads might be: a steep slope being supported by a retaining wall; vehicular loads from an adjacent right-of-way; foundation/footing loads from adjacent buildings; or fill placed next to an existing structure. All these and other sources can impose additional loads on foundation or retaining walls (or even temporary shoring walls) that must be accounted for in a design.

R401.5.4 – Replaces a general requirement in IRC Section 403.1, and gives more guidance. Requires structures be supported by natural soils or structural fill. Structural fill properties must be determined in a geotechnical report. Since special inspections are not included in the IRC but compaction must be verified, a registered design professional (again, usually a geotechnical engineer) is required to conduct the verification. The exception gives an alternative to the full geotechnical report, allowing field verification of 90% compaction in accordance with the ASTM standard if the compaction is again verified by a registered design professional.

Chapter 44 – The standard has already been adopted into the IBC, so the addition in Chapter 44 just brings it into the IRC in order to provide appropriate guidance for the purposes of the exception.

Cost Impact: The code change proposal will not increase the cost of construction, if site development is being done in accordance with IBC requirements as a matter of course, it may increase the cost of construction if not.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D1557 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R401.5 (NEW) #2-RB-SIU.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM D1557-07 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: This committee feels this is outside the scope of the IRC and should be handled by ordinance at the local jurisdiction.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. ~~Footings shall be supported on undisturbed natural soils or engineered fill.~~ Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

R403.1.7 Soil supporting foundations. Footings and foundations shall be supported on undisturbed natural soils or engineered fill. Where fill is used to support the footings or foundations of a building or structure this fill shall comply with the provisions of a geotechnical report acceptable to the *building official*. The compaction shall be verified by a *registered design professional*.

> **Exception:** Compacted fill material 12 inches (305 mm) in depth or less need not comply with a geotechnical report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557, and the compaction is verified by a *registered design professional*.

(Renumber subsequent subsections.)

Add new standard to Chapter 44 as follows:

ASTM

D 1557-12 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft3 (2,700 KN m/m3)]

Commenter's Reason: This proposal simply brings the IRC and the IBC into closer alignment on how to adequately support foundations.

Because the original proposal addressed two separate issues in a single proposal, we have divided them in two Public Comments. This Public Comment addresses soil supporting building foundations. A separate Public Comment will address the other site work requirements. It is notable there were no technical objections raised to this part of the proposal by the Committee or other speakers at the Committee Action Hearings.

This public comment only adopts the regulations regarding how foundations are supported. This will replace the more general statement in Section 403.1 with clearer, more specific requirements as to what constitutes acceptable fill materials for foundation support. The proposed text is based on Section 3304.1.4 and 1804.5 of the 2012 IBC, which are reproduced below for reference. No proposals were made to change these sections in the Group A development process, so they should remain as shown in the 2015 IBC.

As a modification to the original proposal which placed the requirements in the more general Section R401.5, this Public Comment places the added text before the other subsections dealing with soils issues (R403.1.7, footings on or adjacent to slopes, and R403.1.8, foundations on expansive soils). While it may seem to be important enough that the requirement should appear as the first subsection under R403.1, it seemed logical to the WABO committee that it should be grouped with the other soils issues.

A second modification has been made to the original proposal, updating the edition of ASTM D 1557 to the 2012 version, as approved by the Administrative Provisions Committee for the IBC in item ADM62-13.

2012 IBC Section 3304.1.4 and 1804.5:

3304.1.4 Fill supporting foundations. Fill to be used to support the foundations of any building or structure shall comply with Section 1804.5. *Special inspections* of compacted fill shall be in accordance with Section 1704.7.

1804.5 Compacted fill material. Where shallow foundations will bear on compacted fill material, the compacted fill shall comply with the provisions of an *approved* geotechnical report, as set forth in Section 1803.

> **Exception:** Compacted fill material 12 inches (305 mm) in depth or less need not comply with an *approved* report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557. The compaction shall be verified by *special inspection* in accordance with Section 1705.6.

Public Comment 2:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R401.5 Site work. Site work shall be performed in accordance with Sections R401.5.1 through R401.5.3.

R401.5.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Excavation, fill, or shoring, whether temporary or permanent, shall not extend onto adjacent property. Existing footings or foundations that can be affected by an excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

R401.5.2 Slope limits. Slopes for permanent fill shall be not more than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not more than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the submittal of a geotechnical report acceptable to the *building official*.

R401.5.3 Surcharge. No fill or other surcharge loads shall be placed adjacent to a building or structure, or caused to be imposed on them, unless such building or structure is designed to resist the additional loads caused by the fill or surcharge.

Exception: Minor surcharge loads from grading for landscaping purposes shall be permitted where approved by the building official, or where:

1. The grading is done with walk-behind equipment, AND
2. The grade is not increased more than one foot from original design grade.

Commenter's Reason: This proposal simply brings the IRC and the IBC into closer alignment on protection of adjacent property. Our experience has been that when the work being performed damages adjacent property (or is perceived to be the cause of damage), it creates a problem for everyone involved—owners, contractors, designers, and code officials—regardless of whether or not it is addressed in the code. The WABO Technical Code Development Committee believes this is an area of regulation that is missing in the current IRC, especially when compared to the IBC. Putting these regulations in place will likely reduce the hassles for everyone.

However, because it can be viewed as two separate issues are being addressed by the original code change proposal, we have divided them in two Public Comments. This Public Comment addresses the site development aspects of the code change proposal. A separate Public Comment will address the support for foundations.

This public comment adopts regulations regarding site work. As stated in the reason statement for the original proposal, this clearly states whoever is doing the work is responsible to keep the effects of construction on the subject property. Without this text, it can be easily construed to be the adjacent property owner who is responsible to protect his/her own property from the effects of construction—something they are not causing. In addition, under the general code principle "if something is not prohibited, it's allowed," the current code allows cuts or fills to be extend onto adjacent property. We do not believe this is what the code intends, and this Public Comment clarifies the issue. The proposed text is based on Section 3304.1 of the 2012 IBC (which is reproduced below for reference), but adds a new exception based on a change to 2015 IBC Section 1808.3.2 to allow minor surcharges from landscaping activities (Item S184-12). No proposals were made to change IBC Section 3304.1 in the Group A development process, so the 2015 IBC section will be the same as 2012.

The Committee's published reason for disapproval states this is outside the scope of the IRC and should be handled by ordinance at the local jurisdiction. In response:

1. There is nothing in the Scope or Intent sections in the IRC (R101.2 and R101.3) that confine the regulations to the actual building. In fact, Section R101.3 specifically refers to establishing minimum requirements to safeguard the public through "safety to life ***and property*** [emphasis ours]".
2. Other regulations in the code are in place to protect adjacent property from the effects of the new construction (e.g., the requirements in Section R302 for protecting openings near the property line). This proposal is no different, as it also seeks to protect the adjacent property from the effects of the new construction.
3. As stated above, the proposed text is based on text already found in the IBC. For the issue of protecting adjacent property, there is nothing unique about a dwelling built in accordance with the IRC versus one built in accordance with the IBC provisions for R-3 occupancies. That is, protection of adjacent property is an issue for any construction. It therefore follows that if the IBC regulates this issue, there is no reason why the IRC shouldn't.
4. Not all jurisdictions pass local ordinances to deal with this type of issue, and some jurisdictions are prohibited from amending the IRC. The fact that many jurisdictions adopt ordinances regulating this demonstrates there is a need for them in the code. The I-codes form a family of model codes. As such, this text provides model code language that jurisdictions can adopt to protect neighboring properties. This may be especially helpful to those jurisdictions who are restricted from adopting amendments to the model code. For those jurisdictions who have already adopted local ordinances, this text can serve either to refine their current regulations, or eliminate the need to adopt a separate local ordinance.

2012 IBC Section 3304.1, with text extracted for the original proposal underlined:

3304.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Stumps and roots shall be removed from the soil to a depth of not less than 12 inches (305 mm) below the surface of the ground in the area to be occupied by the building. Wood forms which have been used in placing concrete, if within the ground or between foundation sills and the ground, shall be removed before a building is occupied or used for any purpose. Before completion, loose or casual wood shall be removed from direct contact with the ground under the building.

3304.1.1 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the presentation of a soil investigation report acceptable to the *building official*.

3304.1.2 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations which can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against later movement.

RB207-13
Final Action: AS AM AMPC____ D

RB210-13

R403.1, Figure R403.3(1) (NEW)

<u>Proposed Change as Submitted</u>

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

<u>At transitions between footings located at different elevations, precast concrete lintels complying with Figure R403.1(1) shall be permitted in Seismic Design Categories A, B, and C.</u>

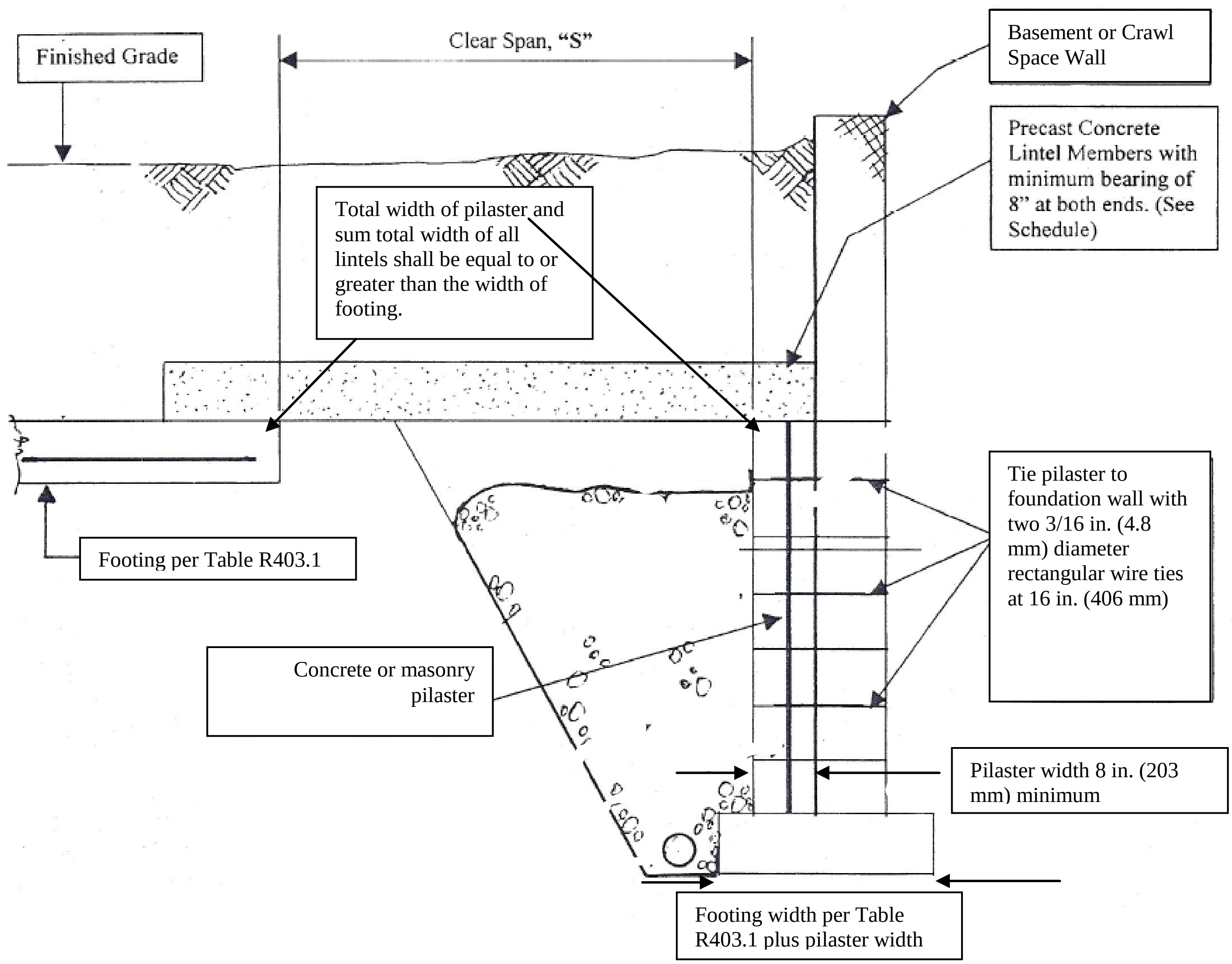


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

Required Reinforcement for Each 4 in. by 8 in. Lintel			Required Reinforcement for Each 6 in. by 8 in. Lintel		
Clear Span, S	Top Bar Size	Bottom Bar Size	Clear Span, S	Top Bar Size	Bottom Bar Size
4'-0"	No. 3	No. 3	4'-0"	No. 3	No. 3
4'-8"	No. 3	No. 3	4'-8"	No. 3	No. 3
5'-4"	No. 3	No. 3	5'-4"	No. 3	No. 3
6'-0"	No. 3	No. 3	6'-0"	No. 3	No. 3
6'-8"	No. 3	No. 3	6'-8"	No. 3	No. 4
7'-4"	No. 3	No. 4	7'-4"	No. 3	No. 5
8'-0"	No. 3	No. 5	8'-0"	No. 3	No. 5

1. All reinforcing bars shall comply with ASTM A615, Grade 60.
2. Minimum 28 day compressive strength of the lintel shall be 3,000 psi.

Reason: Situations often arise in the field whereby it is not practical to have a continuous footing around the perimeter of a residence, such as at the transition between a basement wall and a stem wall below a garage, which is further complicated due to excavating around the basement. A common solution to this situation is to span between the stem wall footer and basement wall footer using a precast lintel to support surcharge loads applied from above.

This change proposes to introduce an alternative design and construction option to allow discontinuous footers when complying with the requirements of the proposed new Figure 403.1(1). Similar detailing has been used successfully for years in various regions of the country.

The detailing options presented here are applicable only to structures assigned to SDC A, B, and C. For higher seismic design categories, the provisions of Section R403.1.3 are still applicable.

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

R403.1-RB-THOMPSON.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee feels this has merit but the figure is confusing. The proponent should work with the structural engineers and clarify the details and bring this back later.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards, requests Approval as Modified by this Public Comment.

Modify the proposal as follows (delete proposed Figure 403.1(1) and replacing with new Figure 403.1(1)

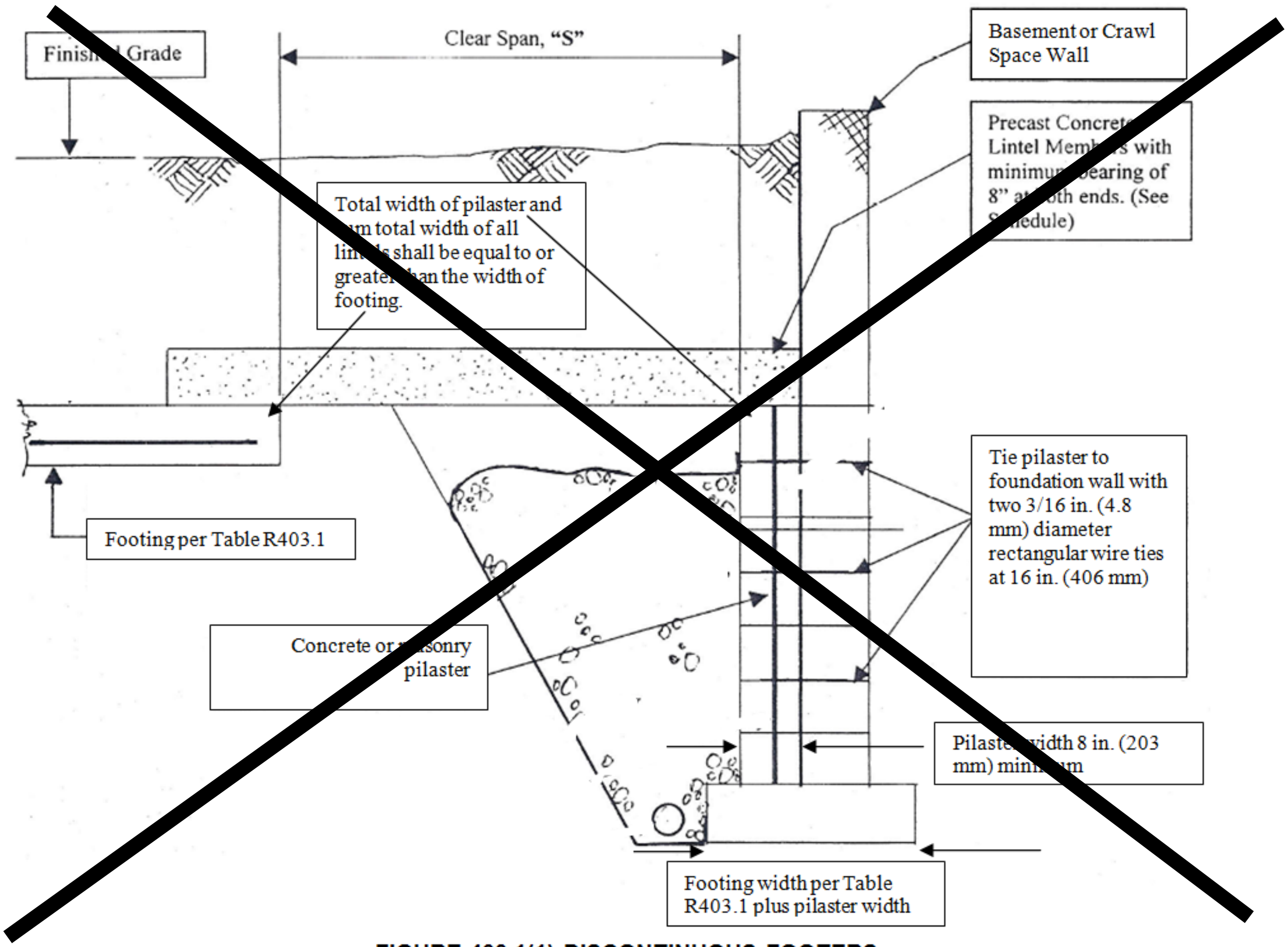
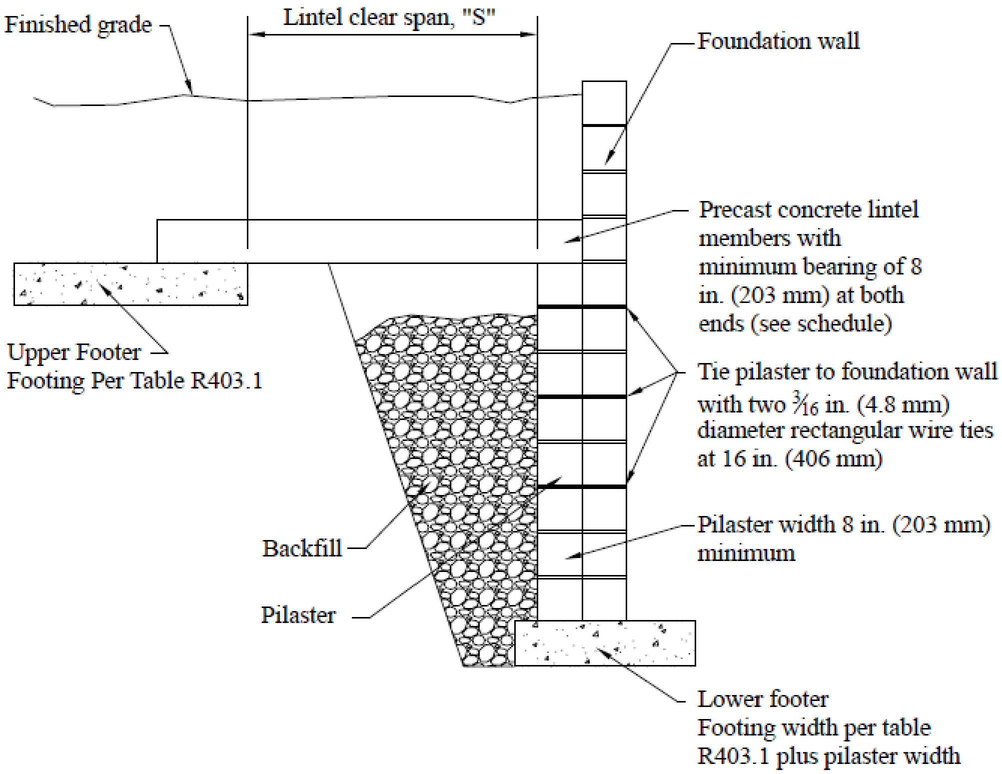


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

Elevation



Finished grade
Lintel clear span, "S"
Foundation wall
Precast concrete lintel members with minimum bearing of 8 in. (203 mm) at both ends (see schedule)
Upper Footer
Footing Per Table R403.1
Tie pilaster to foundation wall with two 3/16 in. (4.8 mm) diameter rectangular wire ties at 16 in. (406 mm)
Backfill
Pilaster width 8 in. (203 mm) minimum
Pilaster
Lower footer
Footing width per table R403.1 plus pilaster width

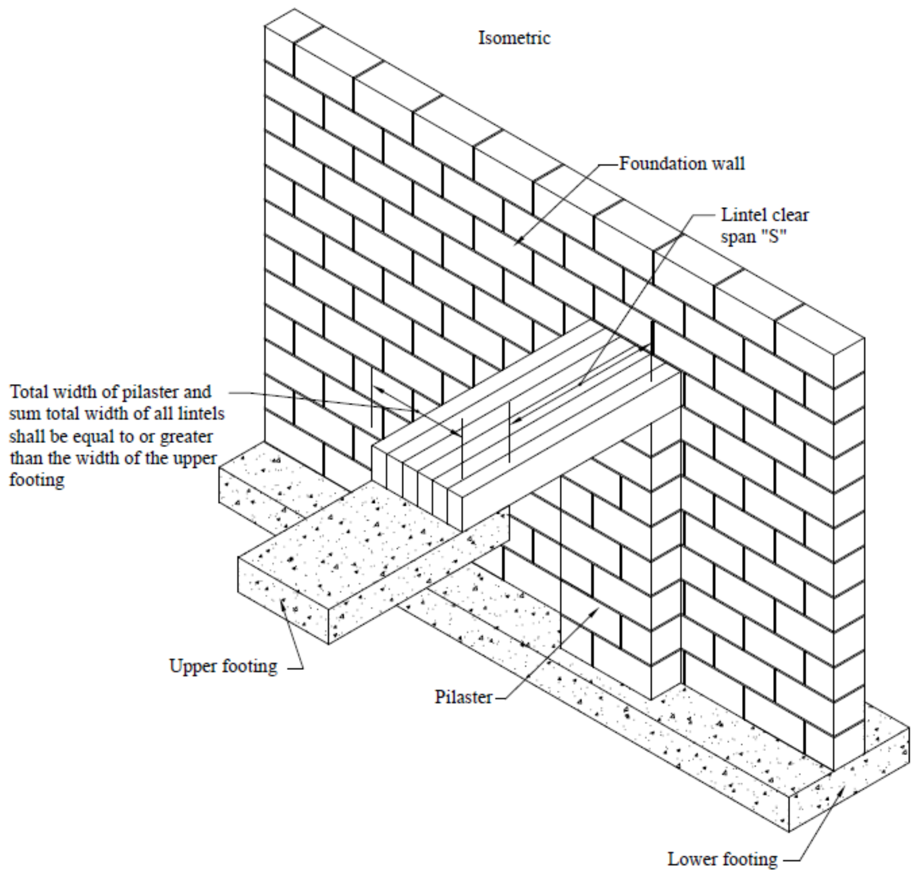


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

Commenter's Reason: At the committee hearings earlier this year several commented that the original figure proposed with RB210-13 could be misinterpreted. The modifications proposed by this public comment incorporate a revised detail shown in both elevation and isometric to illustrate the concept of spanning between footings located at different elevations. These proposed modifications only improve clarity and do not propose any technical changes to the original code change proposal.

RB210-13

Final Action:	AS	AM	AMPC____	D

RB211-13
R403.1.1, Table R403.1(1), Table 403.1(2) (New), Table R403.1(3) (NEW)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association, (BajnaiC@chesterfield.gov), James R. Baty II, Technical Director of Concrete Foundations Association, and Matthew R. Senecal, Senior Engineer, American Concrete Institute

Revise as follows:

R403.1.1 Minimum size. The minimum ~~sizes~~ width, W, and thickness, T, for concrete ~~and masonry~~ footings shall be ~~as set forth~~ in accordance with Table R403.1(1) through R403.1(3) and Figure R403.1(1). The footing width~~, W,~~ shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. ~~Spread footings shall be at least 6 inches (152 mm) in thickness, T.~~ Footing projections, P, shall be at least 2 inches (51 mm) and shall not exceed the thickness of the footing. Footing thickness and projection for fireplaces shall be in accordance with Section R1001.2. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

~~**TABLE R403.1**~~
~~**MINIMUM WIDTH OF CONCRETE PRECAST OR MASONRY FOOTINGS (inches)**~~[a]

TABLE R403.1(1)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT FRAME CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with Light Frame	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
30 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	23 x 6	17 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
50 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	25 x 7	19 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	28 x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
70 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	27 x 9	20 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

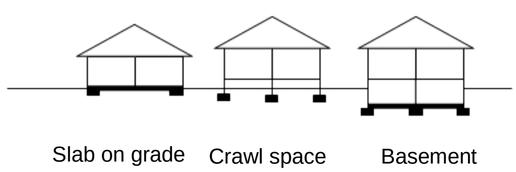
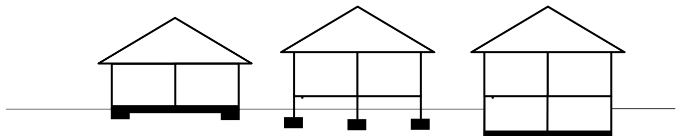


TABLE R403.1(2)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR CONCRETE FOOTINGS FOR LIGHT FRAME CONSTRUCTION WITH BRICK VENEER

Snow load or Roof Live Load	Story and Type of Structure with Brick Veneer	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story - slab on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story - plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
30 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	27 x 9	21 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story - slab on grade	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story - plus basement	33 x 11	24 x 7	20 x 6	16 x 6	14 x 6	12 x 6
50 psf	1 story - slab on grade	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	29 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story - slab on grade	24 x 7	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	3 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
70 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - slab on grade	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story - with crawl space	31 x 11	23 x 7	19 x 6	16 x 6	13 x 6	12 x 6
	3 story - plus basement	37 x 13	28 x 9	22 x 6	18 x 6	16 x 6	14 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

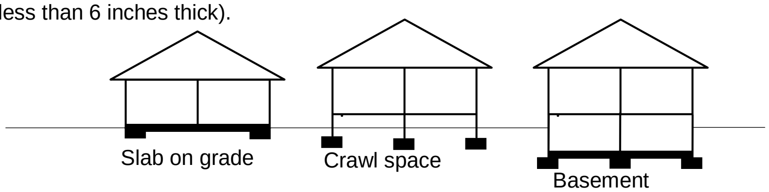


Slab on grade Crawl space Basement

TABLE R403.1(3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS WITH CAST-IN-PLACE CONCRETE OR FULL MASONRY WALL CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story - slab on grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story - slab on grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6
	3 story - with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story - plus basement	44 x 17	33 x 12	27 x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story - slab on grade	27 x 8	20 x 6	20 x 6	13 x 6	12 x 6	12 x 6
	3 story - with crawl space	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - plus basement	36 x 13	27 x 9	22 x 6	18 x 6	16 x 6	14 x 6
70 psf	1 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - slab on grade	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - with crawl space	34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	2 story - plus basement	40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story - slab on grade	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - with crawl space	43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
	3 story - plus basement	49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



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

The existing table was based on:

- a snow load of 50 psf
- 20 feet of tributary roof area
- 16 feet of tributary floor area
- 10 feet first floor height
- 8 feet second and third floor heights

For some parts of the country, the table's assumptions may not "fit" well.

1. These new tables factor in four snow live load conditions that were not previously acknowledged: 20 psf (the minimum allowed per Table R301.6), 30 psf, 50 psf and 70 psf (the maximum to be designed prescriptively by R301.2.3). Between these increments, the table allows for interpolation.
2. The tables account for additional soil bearing conditions. They now provide sizing for 1500 psf, 2000 psf, 2500 psf, and 3000 psf, 3500 psf and 4000psf soil bearing locations.
3. The tables take into consideration the same three framing types as the current table:
    a. Conventional light framing,
    b. Conventional light framing with veneer, and
    c. Cast-in-place concrete or full masonry wall construction.
4. The new tables were expanded to cover more conditions. They now differentiate houses built:
    a. 1, 2 and 3 stories built slab on grade (without a first floor load),
    b. 1, 2 and 3 stories built over a crawl space (with a first floor load and foundation wall/footing),
    c. 1, 2 and 3 stories built with basement (with a first floor load and basement walls. Previously, the table was silent on how to handle the extra load from a masonry or concrete basement wall).
5. The tables also provide the width of the footing based on the loads and the minimum projection – whichever governs. 6" is the minimum thickness already required by Section R403.1.1.
6. The table are based on the loading case of: TL = DL + .75LL
7. General assumptions, formulas and example follow for peer review:

ASSUMPTIONS

House width	32	
Roof ground snow load	varies	psf
Roof dead load	10	psf
Rafter length of house	16	ft
Roof overhang	2	ft
Attic live load	15	psf
Attic dead load	10	psf
Attic tributary width	8	ft
Third floor wall height	8	ft
Third floor wall materials	15	#/ vert ft
Third floor with veneer	45	#/ vert ft
Third floor with cmu wall	100	#/ vert ft
Third floor live load	22.5	psf
Third floor dead load	15	psf
Third floor tributary length	8	ft
Second floor wall height	9	ft
Second floor wall materials	15	#/ vert ft
Second floor with veneer	45	#/ vert ft
Second floor with cmu wall	100	#/ vert ft
Second floor live load	22.5	psf
Second floor dead load	15	psf
Second floor tributary length	8	ft
First floor wall height	10	ft
First floor with light frame	15	#/ vert ft
First floor with veneer	45	#/ vert ft
First floor with cmu wall	100	#/ vert ft
First floor live load	30	psf
First floor dead load	15	psf
First floor tributary length	8	ft
Crawl wall height	3	ft
Basement wall height	10	ft
Wall thickness	10	in
Basement/crawl floor wall materials	125	pcf
Footing width (min)	12	in
Footing thickness (min)	6	in
Concrete weight	150	pcf
	0.0868	pci

SAMPLE CALCULATION WITH FORMULAS

CMU CONSTRUCTION BASED ON 50 psf SNOW LOAD

	DESIGN PARAMETERS (variables)	1 story slab on grade		1 story with crawl		1 story with basement		2 story slab on grade		2 story with crawl		2 story with basement		3 story slab on grade		3 story with crawl		3 story with basement	
Roof load	(Roofspan/2 + Overhangspan) * (Roof-DL + (.75*Roof-LL))	855		855		855		855		855		855		855		855		855	
Attic Floor load	Roofspan/4 * (Attic-DL + .75(Attic-LL))	200		200		200		200		200		200		200		200		200	
TF Wall load	TFht * Wwt													480		480		480	
TF Floor load	Roofspan/4 * (TF-DL + (.75(TF-LL))													300		300		300	
SF Wall load	SFht * Wwt							540		540		540		540		540		540	
SF Floor load	Roofspan/4 * (SF-DL + (.75(SF-LL))							300		300		300		300		300		300	
FF Wall load	FFht * Wwt	600		600		600		600		600		600		600		600		600	
FF Floor load	Rspan/4 * (FF-DL + (.75FF-LL))			360		360				360		360				360		360	
Crawl Wall load	Cht * Cth / 12 * Cwt			250						250						250			
Basement Wall load	Bth * Bthick / 12 * Bwt					833						833						833	
Footing	Footthick / 12 * Footwidth / 12 * Wtcond	75		75		75		75		75		75		75		75		75	
CALCULATED LOAD (plf)		1730		2340		2923		2570		3180		3763		3350		3960		4543	
	Footing width is the greater of: 6" minimum or (Footing width - wall thickness) / 2																		
Soil bearing capacity variances (psf)	1500	14	6	19	6	23	7	21	6	25	8	30	10	27	8	32	11	36	13
	2000	10	6	14	6	18	6	15	6	19	6	23	6	20	6	24	7	27	9
	2500	8	6	11	6	14	6	12	6	15	6	18	6	16	6	19	6	22	6
	3000	7	6	9	6	12	6	10	6	13	6	15	6	13	6	16	6	18	6
	3500	6	6	8	6	10	6	9	6	11	6	13	6	11	6	14	6	16	6
	4000	5	6	7	6	9	6	8	6	10	6	11	6	10	6	12	6	14	6

Cost Impact: The code change proposal may increase the cost of construction.

R403.1(1)-RB-BAJNAI-BATY-SENECAL-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee feels this provides useful tables and provides additional option for builders. This improves the prescribed minimum footing sizes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R403.1 (3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS with CAST-IN-PLACE CONCRETE or FULLY GROUTED MASONONRY WALL CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story - slab on grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story - slab on grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6
	3 story - with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story - plus basement	44 x 17	33 x 12	27 x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story - slab on grade	~~14 X 6~~ 17 x 6	~~12 X 6~~ 13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	~~19 X 6~~ 22 x 6	~~14 X 6~~ 17 x 6	~~12 X 6~~ 13 x 6	12 x 6	12 x 6	12 x 6

	1 story - plus basement	~~23 X 7~~ 28 x 9	~~18 X 6~~ 21 x 6	~~14 X 6~~ 17 x 6	~~12 X 6~~ 14 x 6	12 x 6	12 x 6
	2 story - slab on grade	~~21 X 6~~ 27 x 8	~~15 X 6~~ 20 x 6	~~12 X 6~~ 16 x 6	~~12 X 6~~ 13 x 6	12 x 6	12 x 6
	2 story - with crawl space	~~25 X 8~~ 32 x 11	~~19 X 6~~ 24 x 7	~~15 X 6~~ 19 x 6	~~13 X 6~~ 16 x 6	~~12 X 6~~ 14 x 6	12 x 6
	2 story - plus basement	~~30 X 10~~ 38 x 14	~~23 X 6~~ 28 x 9	~~18 X 6~~ 23 x 6	~~15 X 6~~ 19 x 6	~~13 X 6~~ 16 x 6	~~12 X 6~~ 14 x 6
	3 story - slab on grade	~~27 X 8~~ 35 x 13	~~20 X 6~~ 27 x 8	~~20 X 6~~ 21 x 6	~~13 X 6~~ 18 x 6	~~12 X 6~~ 15 x 6	~~12 X 6~~ 13 x 6
	3 story - with crawl space	~~32 X 11~~ 41 x 15	~~24 X 7~~ 31 x 10	~~19 X 6~~ 24 x 7	~~16 X 6~~ 20 x 6	~~14 X 6~~ 17 x 6	~~12 X 6~~ 15 x 6
	3 story - plus basement	~~36 X 13~~ 47 x 18	~~27 X 9~~ 35 x 12	~~22 X 6~~ 28 x 9	~~18 X 6~~ 23 x 7	~~16 X 6~~ 20 x 6	~~14 X 6~~ 17 x 6
70 psf	1 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - slab on grade	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - with crawl space	34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	2 story - plus basement	40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story - slab on grade	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - with crawl space	43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
	3 story - plus basement	49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address an inconsistency discovered by ICC staff following Dallas. The values were checked and an error was detected in the spreadsheet producing the footing sizes for the third table, which is corrected with this public comment.

Public Comment 2:

Stephen S. Szoke, Portland Cement Association and Masonry Alliance for Codes and Standards requests Disapproval.

Commenter's Reason: The committee action on the proposed code change should be overturned for the following eleven reasons. Code change proposal RB211-13 should be disapproved because it:

1) unintentionally or otherwise eliminates the use of masonry footings;
2) contains errors in the tables;
3) contains errors in the calculations based on the assumptions;
4) many of the assumptions are inaccurate and misleading;
5) results in overdesigned footings for many systems;
6) concrete and masonry walls are unfairly penalized as typical foundation systems will be required to have larger footings than necessary;
7) lacks the necessary guidance to the designer, builder and code official on the use and determination of the values provided in the tables;
8) does not eliminate the need the calculate dead and live loads to determine footing size;
9) does not provide sufficient technical information for evaluating code compliance;
10) creates confusion which increases the risk of structural failure; and
11) precludes wall constructions otherwise permitted by the code. Each of these reasons for overturn committee action is described below.

1) **Masonry Footers Eliminated**. Code change removes "and masonry" as a permissible footer system eliminating the use of masonry foundation systems previously permitted in the code although they have proven effective footing systems and especially useful in areas, primarily rural areas, too far from a ready-mixed concrete batch site or sites not readily accessible by ready-mixed concrete trucks. Approval of this code change modifying section R403.1.1 and related tables should be overturned so that the use of masonry footer systems can continue to be permitted.

2) **Errors in Tabular Values**. There are numerous errors in the tabular values. For example in Table R403.1(3) the minimum footer size for a one-story structure with a crawlspace where the snow load is 30 psf and soil bearing capacity is 2000 psf, is listed as a 15 x 6 footing. The minimum footing size for a one-story structure with a crawlspace where the snow load is 50 psf and the soil bearing capacity is 2000 psf, is 14 x 6. It is illogical that the footing size decreases when as the snow load increases and the only variation is snow load.

Excerpts from Table R403.1(3)

Snow Load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf) 2000
30 psf	1 story – with crawl space	15 x 6
50 psf	1 story – with crawl space	14 x 6

3) **Errors in Assumptions and Sample Calculations.** The assumptions advise that the weight of a concrete masonry unit wall is 100 pounds per linear foot of height and the height of the third floor wall systems is 8 feet. These assumptions result in a weight per linear foot of 800 pounds [100 #/vert. ft. X 8 feet]. The sample calculations provided in the reasoning statement show the weight of the third floor portion of the wall as 480 pounds per linear foot of footing length.

Dead weight of CMU wall 100 lb per vert. ft x 8 ft = 800 lb per linear ft.
Dead weight shown in SAMPLE CALCULATION WITH FORMULAS: 480 lb per linear ft.

4) **Assumptions Are Inaccurate**. Masonry veneers are not only applied over the exterior wall surface, but also over the band joists of interim floors. Similarly, for concrete and concrete masonry walls, joists are typically fire cut into the wall assembly or hung with joist hangers. This results in additional weight for the concrete or concrete masonry wall height covering the band joists. Where floor construction consists of 2x10 joists and the walls are constructed of concrete masonry units which per the assumptions weighs 100 pounds per vertical foot the result is over 150 pounds per linear foot in a three story building on a slab-on-grade foundation that are not accounted for in determining the minimum footer thickness.
While this may be relatively insignificant for single-story structures, for three-story structures the additional load could be excessive. If the load for the masonry spanning band joists was accounted for in the wall weight, then the loads for single-story structures are conservative. However, if the loads were not accounted for, then the calculated loads are less than required to satisfy the bearing conditions and could lead to failures.

Deadweight of Concrete Masonry Wall

Stories	Foundation System	Without Considering Band Joists	Considering Band Joists
1	Slab on Ground	1000 lb	1000 lb
1	Basement	2000 lb	1083 lb
2	Slab on Ground	1900 lb	1983 lb
2	Basement	2900 lb	3067 lb
3	Slab on Ground	2700 lb	2867 lb
3	Basement	3700 lb	3950 lb

5) **Over Design**. Many of the assumptions result in the determination of conservative loads and thus conservative footing dimensions. The basement wall height is assumed to be 10 feet in height. For new homes where the basement wall height is only 8 feet, using the assumptions presented in the proposed code change, the difference in dead load on the footing would be over 200 pounds per linear foot.

6) **Mass Wall Unfairly Penalized**. In the proposed change, concrete and masonry walls are assumed to have a weight per linear foot of wall height of 100 lbs. This weight ranges from 18 to 60% heavier than most common 8" concrete and masonry wall systems unfairly penalizing these systems by increasing footing size and respective costs as compared to other wall systems. Since the footing sizes in the the proposed table are minimum footing sizes, for most applications the proposed change is requiring substantially larger footings than necessary to distribute loads to soil. This is especially true for concrete and masonry wall systems. The result is inefficient and less sustainably utilization of materials. For some commonly used basement and above grade concrete masonry walls the weight used in the assumptions is is 65% larger than the actual wall weight. Shown below are some weights of various concrete and concrete masonry wall systems.

Wall System	Material Density lb per cubic foot	Wall Thickness Nominal (Actual)	Wall Weight lb/ per vertical foot
8" Light weight CMU (52% solid)	120 unit concrete	8" (7.625")	35
8" Light weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	8" (7.625")	50
8" Light weight CMU (Fully grouted)	120 unit concrete 140 grout	8" (7.625")	77
10" Light weight CMU (48% solid)	120 unit concrete	10" (9.625")	40
10" Light weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	10" (9.625")	66
10" Light weight CMU (Fully grouted)	120 unit concrete 140 grout	10" (9.625")	99
8" Medium weight CMU (52% solid)	120 unit concrete	8" (7.625")	40
8" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	8" (7.625")	55
8" Medium weight CMU (Fully grouted)	120 unit concrete 140 grout	8" (7.625")	82
10" Medium weight CMU (48% solid)	120 unit concrete	10" (9.625")	46
10" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	120 unit concrete 140 grout	10" (9.625")	72
10" Medium weight CMU (Fully grouted)	120 unit concrete 140 grout	10" (9.625")	105
8" Medium weight CMU (52% solid)	135 unit concrete	8" (7.625")	45
8" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	135 unit concrete 140 grout	8" (7.625")	60
8" Medium weight CMU (Fully grouted)	135 unit concrete 140 grout	8" (7.625")	87
10" Medium weight CMU (48% solid)	135 unit concrete	10" (9.625")	52
10" Medium weight CMU (Partially Grouted (4' o.c. vert and horiz.)	135 unit concrete 140 grout	10" (9.625")	78
10" Medium weight CMU (Fully grouted)	135 unit concrete 140 grout	10" (9.625")	110
8" Cast-in-Place Concrete	140 Concrete	8" (7.5")	88
6 Concrete Wall (Stay-in-Place Forms)	140 Concrete	6" (5.5")	64
4" Cast-in Place (Stay-in-Place Forms)	140 Concrete	4" (3.5")	41
8" Lightweight Precast (50% Solid)	140 Concrete	8" (7.5")	44

7) **Lack of Guidance**. All assumptions in calculated minimum footing should be included as footnotes to the proposed Table so that alternative designs may be appropriately determined to avoid excess and unnecessary costs and use of materials where weights of wall systems deviate from the assumptions.

8) **Calculations Still Required**. Calculations of actual dead and live loads are still required because the assumptions are unknown and table provides minimum thickness. Designer, builder and/or code official would still need to calculate the loads to determine if the minimum footing size needs to be increased.

9) **Insufficient Information for Code.** The information provided does not address the actual building systems. This information might be appropriate for commentary should all assumption be included and the values correctly calculated. Alternatively, direct design table could be generated for use in the code or provided in referenced standards.

10) **Confusion and Risk of Failure.** The increased complexity provided with the tables implies that this is the footing size provided is the size that should be used and does not appropriately or adequately communicate that these are still minimum footing sizes. Since calculations are still required to determine if minimum footing size the tables serve no significant benefit and suggest that for the conditions described, the minimum footing size is adequate. However, the code proposal does not include all assumptions which means the footing may be undersized and increase the potential for failures.

Exclusive to Select Wall Systems. The tables are inappropriate as they do not address many wall systems. For example, there are not provisions for log home and other alternative construction methods.

RB211-13

Final Action: AS AM AMPC____ D

RB212-13

Figure R403.1(1), Figure R403.1(2), Figure R403.1(3), R403.1.3.2, Figure R403.1.3.2

Proposed Change as Submitted

Revise as follows:

~~FIGURE R403.1(1)~~
~~CONCRETE AND MASONRY FOUNDATION DETAILS~~

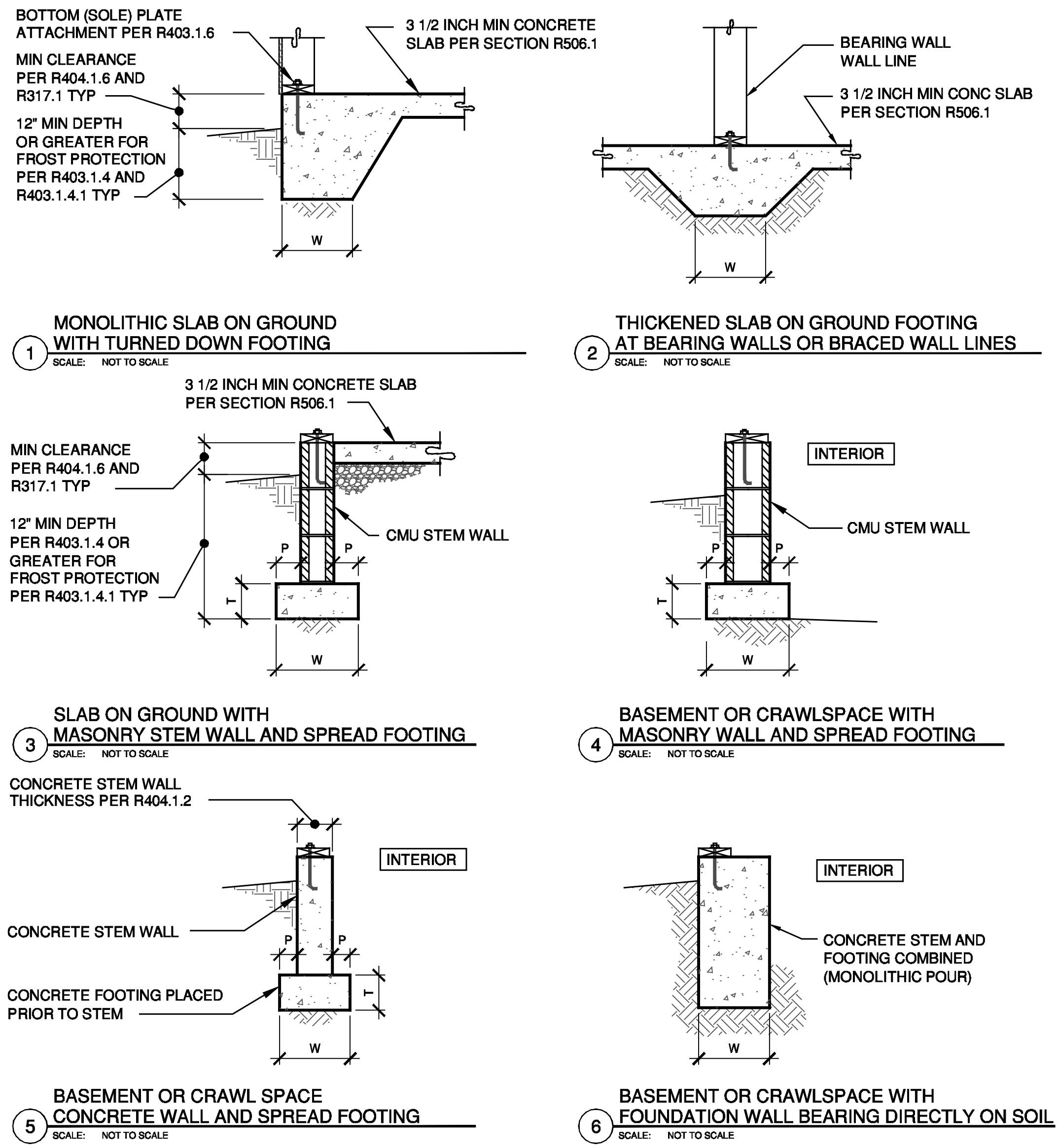


FIGURE R403.1(1)

PLAIN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC A, B AND C a, b, c, d, e, f, g

W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
e. SEE FIGURE R403.1(2) FOR ADDITIONAL FOOTING REQUIREMENTS FOR STRUCTURES IN SDC D0, D1 AND D2 AND TOWNHOUSES IN SDC C
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(1)
PLAN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS OM SDC Do, D_1 AND D_2 [a,b,c,d,e,f,g]

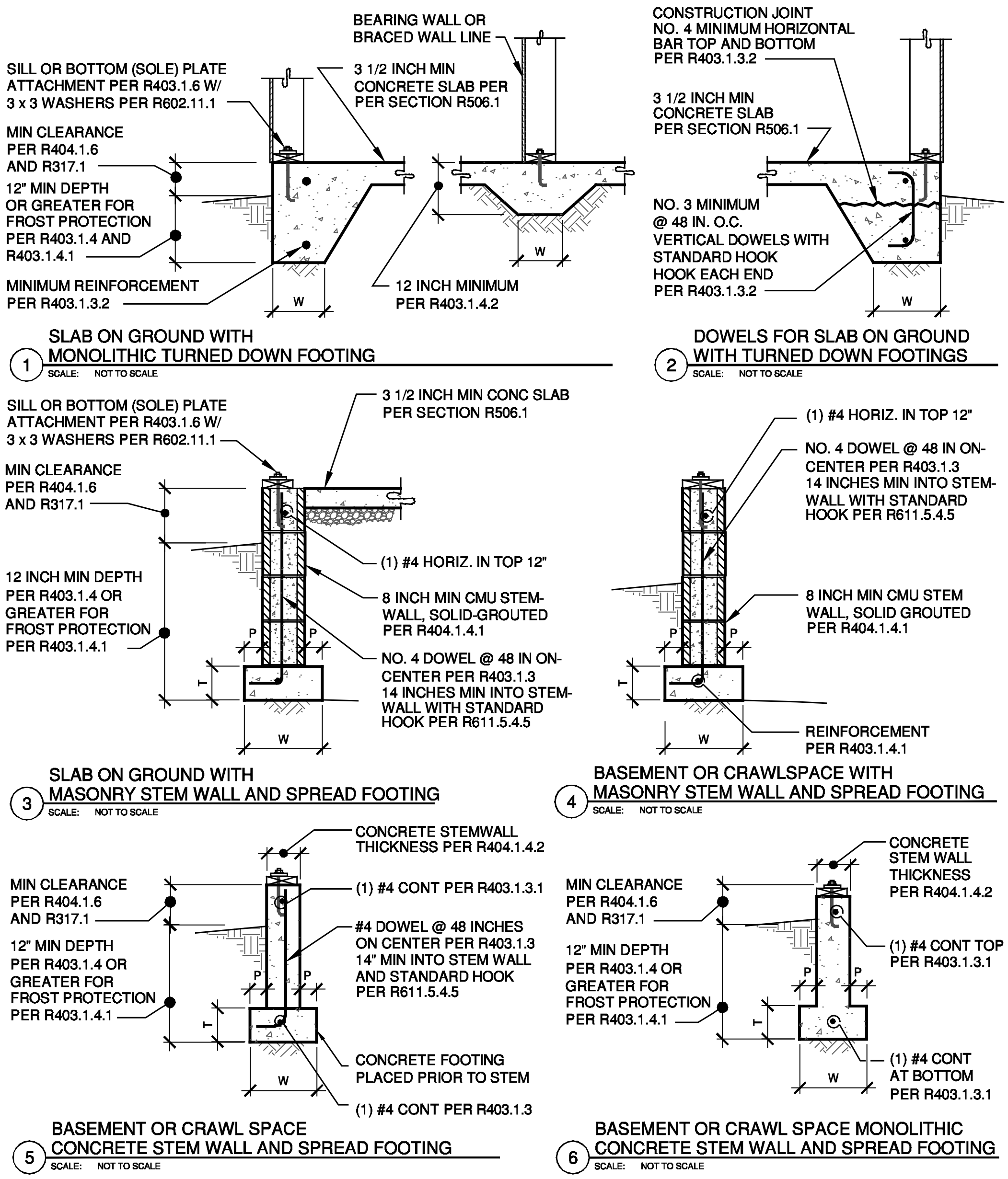


FIGURE R403.1(2)
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D0, D1 AND D2 [a, b, c, d, e, f, g]

W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(2)
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D_O, D_1 AND D_2[a,b,c,d,e,f,g]

FIGURE ~~R403.1(2)~~ R403.1(3)
PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION

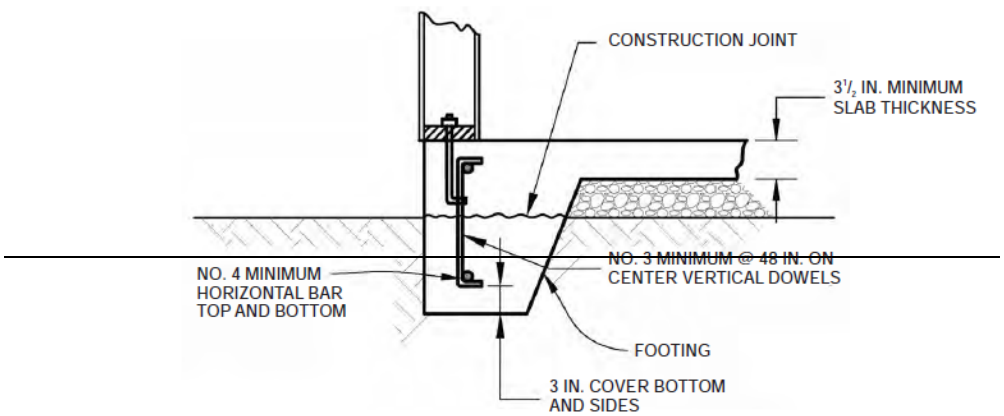
FIGURE ~~R403.1(3)~~ R403.1(4)

PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

R403.1.3.2 Slabs-on-ground with turned-down footings. Slabs on ground with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing

Exception: For slabs-on-ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks on each end shall be provided in accordance with Figure ~~R403.1.3.2~~ R403.1(2), detail 2. Standard hooks shall comply with Section R611.5.4.5.



For SI: 1 inch = 25.4 mm.

FIGURE R403.1.3.2
DOWELS FOR SLABS-ON-GROUND WITH TURNED-DOWN FOOTINGS

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

This proposal is to revise and update the existing footing figures in the code. The revised figures improve the graphic quality of the figures and add information that is helpful to the code user. In addition, the current figures do not show, describe or address the specific reinforcement requirements for Seismic Design Categories D0, D1 and D2. Initial attempts to incorporate the SDC reinforcement requirements into the set of figures resulted in overly complex details that would contain information not necessary to code users in lower SDC's. Therefore, the committee decided to generate a second set of figures specifically detailing the reinforcement requirements for the applicable SDC's.

This proposal also moves existing figure R403.1.3.2 to Figure R403.1(2) and changes the reference in section R403.1.3.2. The footnotes were also expanded to alert the code user to other applicable sections relating to foundations but were not necessarily helpful to add to the figures such as vapor barriers and ventilation.

This proposal does not change any requirements in the current code and are a great improvement to the code enabling the code user to visualize the code requirements.

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

R403.1(1)-F-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee likes the concept and it would add useful figures to the code. However, there are some inaccuracies in the figures related to reinforcing for high seismic. The proponent should rework this and bring it back.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

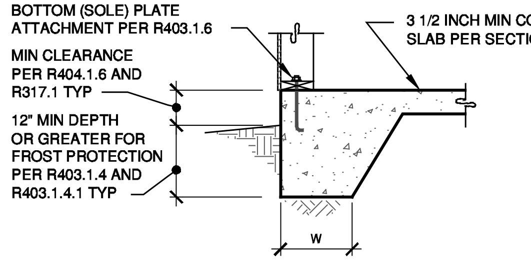
Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

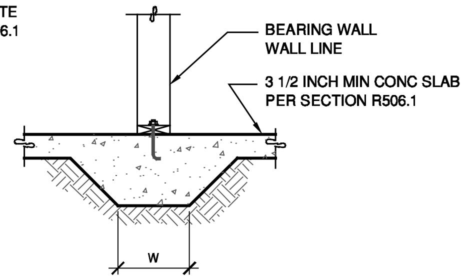
R403.1.1 Minimum size. Minimum sizes for concrete and masonry footings shall be as set forth in Table R403.1 and Figure R403.1(1) or Figure R403.1.3, as applicable. The footing width, W, shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Spread footings shall be at least 6 inches (152 mm) in thickness, T. Footing projections, P, shall be at least 2 inches (51 mm) and shall not exceed the thickness of the footing. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

R403.1.3 Seismic reinforcing. Concrete footings located in Seismic Design Categories D0, D1 and D2, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this Section and Figure R403.1.3. Bottom reinforcement shall be located a minimum of 3 inches (76 mm) clear from the bottom of the footing. In Seismic Design Categories D0, D1 and D2 where a construction joint is created between a concrete footing and a stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing, have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. In Seismic Design Categories D0, D1 and D2 where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing and have a standard hook. In Seismic Design Categories D0, D1 and D2 masonry stem walls without solid grout and vertical reinforcing are not permitted.

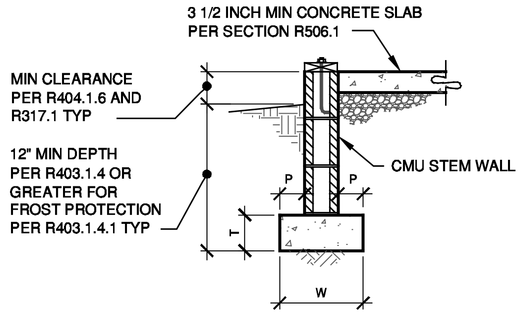
Replace Figure R403.1(1) as follows:



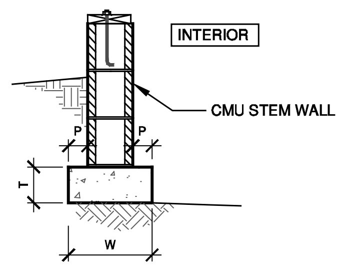
1 MONOLITHIC SLAB ON GROUND WITH TURNED DOWN FOOTING
SCALE: NOT TO SCALE



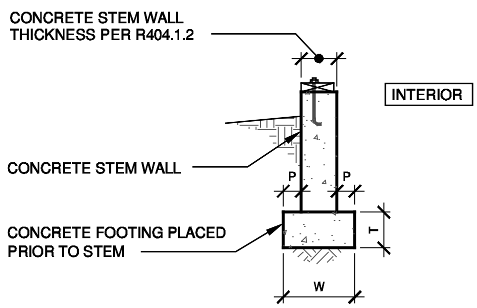
2 THICKENED SLAB ON GROUND FOOTING AT BEARING WALLS OR BRACED WALL LINES
SCALE: NOT TO SCALE



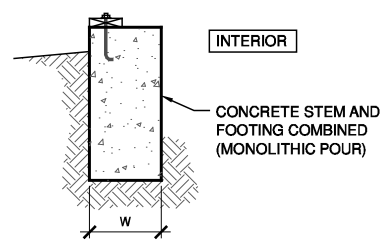
3 SLAB ON GROUND WITH MASONRY STEM WALL AND SPREAD FOOTING
SCALE: NOT TO SCALE



4 BASEMENT OR CRAWLSPACE WITH MASONRY WALL AND SPREAD FOOTING
SCALE: NOT TO SCALE



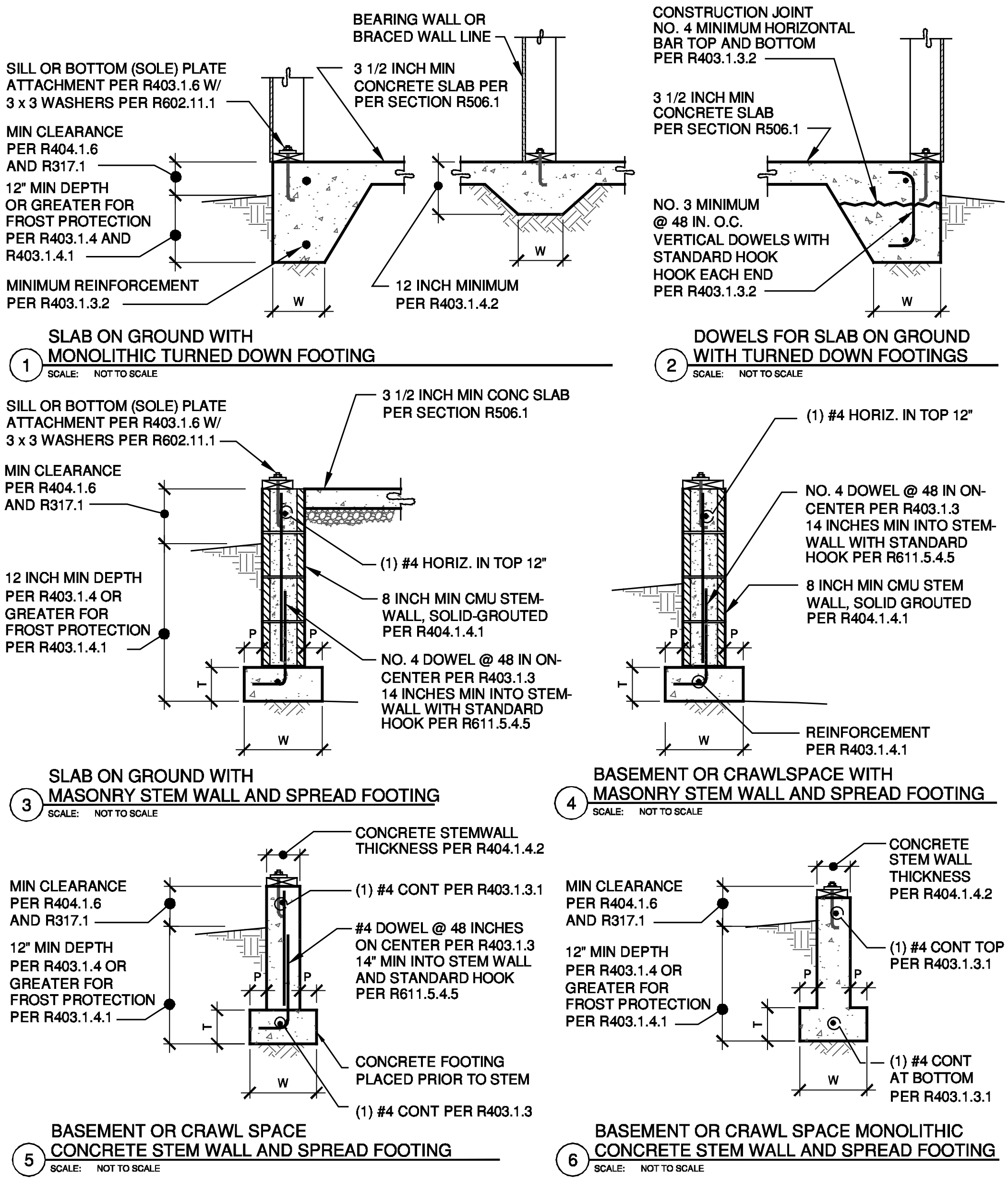
5 BASEMENT OR CRAWL SPACE CONCRETE WALL AND SPREAD FOOTING
SCALE: NOT TO SCALE



6 BASEMENT OR CRAWLSPACE WITH FOUNDATION WALL BEARING DIRECTLY ON SOIL
SCALE: NOT TO SCALE

W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
e. SEE FIGURE R403.1(2) FOR ADDITIONAL FOOTING REQUIREMENTS FOR STRUCTURES IN SDC D0, D1 AND D2 AND TOWNHOUSES IN SDC C
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(1)
PLAIN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS ~~OM~~ IN SDC A, B AND C ~~D_0, D_1 AND D_2~~ [a,b,c,d,e,f,g]



W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1.3 ~~(2)~~
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D_O, D_1 AND D_2 [a,b,c,d,e,f,g]

FIGURE R403.1(2) ~~R403.1(3)~~
PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION

FIGURE R403.1(3) ~~R403.1(4)~~
PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

R403.1.3.2 Slabs-on-ground with turned-down footings. Slabs on ground with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing

Exception: For slabs-on-ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks on each end shall be provided in accordance with Figure R403.1.3 ~~(2)~~, detail 2. Standard hooks shall comply with Section R611.5.4.5.

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committee's concerns. The code development committee thought the details added a lot of understanding but found a few minor flaws:

1. The title of Figure R403.1(1) was corrected to reflect that the details apply to SDC A,B and C only.

2. The numbering in the second figure was changed to reflect that the details apply to Section R403.1.3 for SDC D_0, D_1 and D_2 .

3. The appropriate figure references have been provided in Section R403.1.1 and R403.1.3.

RB212-13

Final Action: AS AM AMPC____ D

RB216-13

R403.1.3, R403.1.3.1, R403.1.3.2, R403.1.3.5 (NEW), R403.1.3.5.1 (NEW), R403.1.3.5.2 (NEW), R403.1.3.5.3 (NEW), R403.1.3.5.4 (NEW), R403.1.3.6 (NEW), R403.1.4.2

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R403.1.3 ~~Seismic reinforcing~~ Footing and stem wall reinforcing in Seismic Design Categories D_0, D_1 and D_2 . Concrete footings located in Seismic Design Categories D_0, D_1 and D_2, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this section. ~~Bottom~~ ~~r~~Reinforcement shall be ~~located~~ installed in accordance with Section R403.1.3.5. ~~a minimum of 3 inches (76 mm) clear from the bottom of the footing.~~

~~In Seismic Design Categories D_0, D_1 and D_2 where a construction joint is created between a concrete footing and a stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall.~~

~~In Seismic Design Categories D_0, D_1 and D_2 where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing and have a standard hook. In Seismic Design Categories D_0, D_1 and D_2 masonry stem walls without solid grout and vertical reinforcing are not permitted.~~

> ~~**Exception:** In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.~~

~~**R403.1.3.1 Foundations with stemwalls.** Foundations with stem walls shall have installed a minimum of one No. 4 bar within 12 inches (305 mm) of the top of the wall and one No. 4 bar located 3 inches (76 mm) to 4 inches (102 mm) from the bottom of the footing.~~

R403.1.3.1 Concrete stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a construction joint is created between a concrete footing and a concrete stem wall, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to the bottom of the footing and shall have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located three to four inches from the bottom of the footing.

R403.1.3.2 Masonry stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a masonry stem wall is supported on a concrete footing, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to the bottom of the footing and have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the wall and one No. 4 horizontal bar shall be located three to four inches from the bottom of the footing. Masonry stem walls shall be solid grouted.

~~R403.1.3.2~~ **R403.1.3.3 Slabs-on-ground with turned-down footings.** In Seismic Design Categories D_0, D_1 and D_2, Slabs on ground cast monolithically with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth..

> ~~**Exception:** For slabs-on-ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.~~

Where the slab is not cast monolithically with the footing~~,~~ one No. 3 or larger vertical dowels with standard hooks on each end shall be ~~provided~~ installed at not more than 4 feet (1219 mm) on center in accordance with Figure R403.1.3.2 . Standard hooks shall comply with Section R611.5.4.5.

~~**R403.1.4.2 Seismic conditions**~~ **R403.1.3.4 Interior bearing and braced wall panel footings in Seismic Design Categories D_0, D_1 and D_2.** In Seismic Design Categories D_0, D_1 and D_2, interior footings supporting bearing walls or *braced wall panels,* ~~bracing walls~~ and cast monolithically with a slab on *grade*~~,~~ shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

R403.1.3.5 Reinforcement. Footing and stem wall reinforcement shall comply with Sections R403.1.3.5.1 through R403.1.3.5.4.

R403.1.3.5.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R. In buildings assigned to Seismic Design Category A, B or C, the minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). In buildings assigned to Seismic Design Category D0, D1 or D2, reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).

R403.1.3.5.2 Location of reinforcement in wall. The center of vertical reinforcement in stem walls shall be located at the centerline of the wall. Horizontal and vertical reinforcement shall be located in footings and stem walls to provide the minimum cover required by Section R403.1.3.5.3.

R403.1.3.5.3 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm). The minus tolerance for cover shall not exceed the smaller of one-third the required cover or 3/8 inch (10 mm).

R403.1.3.5.4 Lap splices. Vertical and horizontal reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R611.5.4.(1) and Figure R611.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure R611.5.4(1).

R403.1.3.6 Isolated concrete footings. In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.

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

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language in the current sections of code that address reinforcement required for Seismic Design Categories D0, D1 and D2.

The title and language in section R403.1.3 is changed for clarity. Additionally, a note is added that references a new section, R403.1.3.4, that defines the installation requirements for the reinforcement.

The existing language describing concrete stem walls and masonry stem walls on concrete footings are separated into two sections, "Concrete stem walls" and "Masonry stem walls" respectively.

Section R403.1.3.1 describes the existing requirements for the horizontal reinforcement at the top of the stem wall and the bottom of the footing. This proposal deletes that section and incorporates the language into the two sections describing the requirements for the stem wall, R403.1.3.1 and R403.1.3.2 respectively.

The language in the existing section R403.1.3.2 for slabs on ground is changed to clarify that this section is addressing turned down footings cast monolithically with the slab since there are new provisions in the code to allow turned down footings that are not cast monolithically with the slab. Also, the existing exception for the reinforcement to be installed in the middle third of the footing have been moved into the section instead of being an exception.

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

R403.1.3-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal needs additional work and brought back. An inappropriate standard, ASTM A706 is referenced in R403.1.3.5.1. Sections R403.1.3.1 and R403.1.3.2 require vertical bars to extend to the bottom of the footing and no clearance is specified.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.1.3 Footing and stem wall reinforcing in Seismic Design Categories D_0, D_1 and D_2 . Concrete footings located in Seismic Design Categories D_0, D_1 and D_2, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this section. Reinforcement shall be installed with support and cover in accordance with Section R403.1.3.5.

R403.1.3.1 Concrete stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a construction joint is created between a concrete footing and a concrete stem wall, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall have a standard hook and extend to the bottom of the footing and shall have support and cover as specified in Section R403.1.3.5.3. ~~a standard hook~~ and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located at the bottom of the footing.

R403.1.3.2 Masonry stem walls with concrete footings. In Seismic Design Categories D_0, D_1 and D_2 where a masonry stem wall is supported on a concrete footing, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall have a standard hook and extend to the bottom of the footing and shall have support and cover as specified in Section R403.1.3.5.3.~~and have a standard hook.~~ and extend a minimum of 14 inches (357 mm) into the stem wall.

Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the wall and one No. 4 horizontal bar shall be at the bottom of the footing. Masonry stem walls shall be solid grouted.

R403.1.3.3 Slabs-on-ground with turned-down footings. In Seismic Design Categories D_0, D_1 and D_2, Slabs on ground cast monolithically with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth.

Where the slab is not cast monolithically with the footing, one No. 3 or larger vertical dowels with standard hooks on each end shall be installed at not more than 4 feet (1219 mm) on center in accordance with Figure R403.1(1). Standard hooks shall comply with Section R611.5.4.5.

R403.1.3.4 Interior bearing and braced wall panel footings in Seismic Design Categories D_0, D_1 and D_2. In Seismic Design Categories D0, D1 and D2, interior footings supporting bearing walls or *braced wall panels* and cast monolithically with a slab on *grade* shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

R403.1.3.5 Reinforcement. Footing and stem wall reinforcement shall comply with Sections R403.1.3.5.1 through R403.1.3.5.4

R403.1.3.5.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R~~. In buildings assigned to Seismic Design Category A, B or C, t~~The minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). ~~In buildings assigned to Seismic Design Category D0, D1 or D2, reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).~~

R403.1.3.5.2 Location of reinforcement in wall. The center of vertical reinforcement in stem walls shall be located at the centerline of the wall. Horizontal and vertical reinforcement shall be located in footings and stem walls to provide the minimum cover required by Section R403.1.3.5.3.

R403.1.3.5.3 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm). ~~The minus tolerance for cover shall not exceed the smaller of one-third the required cover or 3/8 inch (10 mm).~~

R403.1.3.5.4 Lap splices. Vertical and horizontal reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R611.5.4(1) and Figure R611.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure R611.5.4(1).

R403.1.3.5 Isolated concrete footings. In detached one- and two-family *dwellings* which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.

Commenter's Reason: The ICC Building Code Action Committee (BCAC) identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. The original proposal specifically addressed conflicts and confusing language in the current sections of code that address reinforcement required for Seismic Design Categories D0, D1 and D2. The items that were intended to be addressed are listed in the original reason statement.

There were some items about the original proposal that were brought up at the Committee Action Hearings and this public comment addresses those items.

1. There was an inaccurate reference to ASTM A706 standard in R403.1.3.5.1. This language is not new in the code. The new section (R403.1.3.5.1) in the proposal specifying the reinforcement materials was copied from the existing section R404.1.2.3.7. The portions of the section that are deleted from R403.1.3.5.1 in this public comment should not have been copied over.

2. The Report of Hearings also stated that in Sections R403.1.3.1 and R403.1.3.2 the proposed language merely specified that ***"…the vertical bars to extend to the bottom of the footing and no clearance is specified."*** This was intentional in the original proposal. The original language in this section specified that*, "The vertical bar shall extend to 3 inches (76mm) clear of the bottom of the footing…"* In section R403.1.3.1 it stated that footings shall have *"…one No. 4 bar located 3 inches (76mm) to 4 inches (102mm) from the bottom of the footing."* There were no other clearances specified such as to the formwork or where the concrete will not be exposed to earth or weather. These clearances are defined in ACI standards and also currently exist in R404.1.2.3.7.4. The original proposal removed the one specific clearance requirement and added a new section, copied from R404.1.2.3.7.4, to cover all clearances and support. This new section is referenced in the charging statement in R403.1.3 and applies to all the sections that follow.

RB216-13
Final Action: AS AM AMPC____ D

RB219-13
R403.1.6

Proposed Change as Submitted

Proponent: Hope Medina, Colorado Code Consulting, representing Colorado Chapter of ICC (hmedina@coloradocode.net)

Revise as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. <u>The bolts shall be located a minimum 1 ¾" from the plate's edge or in the middle third of the plate's edge.</u> A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).
3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).

Reason: It has become a common occurrence to see an anchor bolt placed at the edge of the sole plate, and on many occasions the threads of the bolt are visible. The "practicing industry standard" is for the bolt to be located at least two bolt diameters from the plate's edge, but there is nothing in the IRC to govern this. We require two bolts per plate, within 12" of a break, and spaced no more than 6 feet apart, but nothing plainly referencing it's placement from the plates edge. Having a specified placement of the bolt in the bottom plate allows for proper enforcement while still giving some flexibility to the contractors.
Simpson Strong Tie has performed tests demonstrating that the bolt lost the expected anchoring capacity when placed closer than 1 ¾" from the plate's edge.

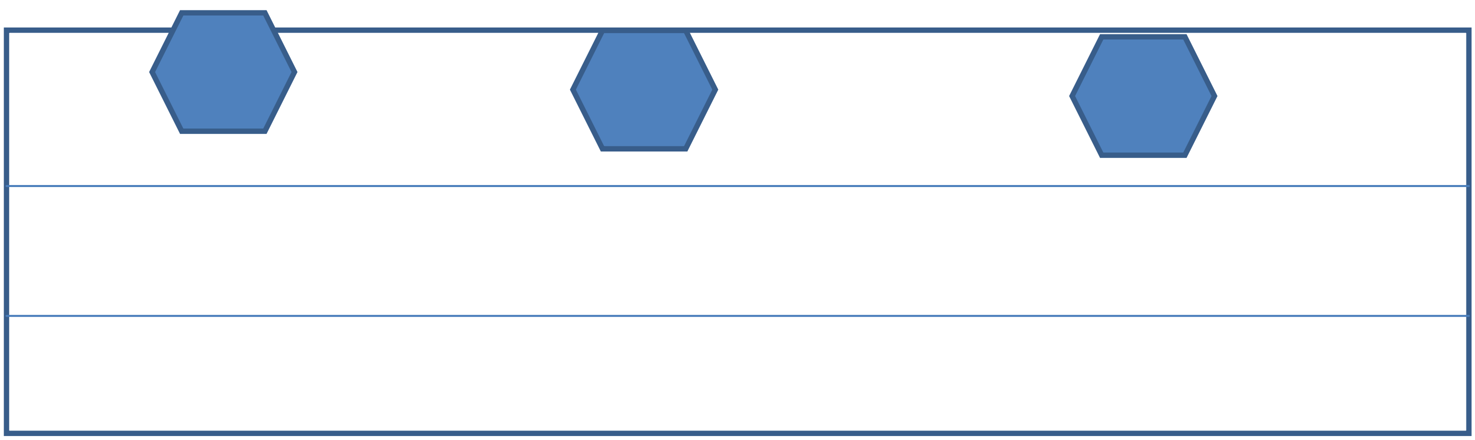
Both the Simpson Strong Tie Wood Construction Connectors 2011-2012 edition and the USP Structural Connectors state that their connectors must have a minimum placement of 1 ¾ inches from the edge.
The IRC reference the NDS for wood design for items not covered in the code like wood edge and end distances. The 2012 NDS has edge distance of ¾" for shear and 2" for wind loads (Table 11.5.1C). So if the edge distance is 1-1/8" you would need to reduce the anchor capacity with an 0.56 allowable load adjustment factor (1.125/2) when resisting wind loads. So you can space in the middle 1/3 of plate, but you may need to increase the number of bolts for wind.

In chapter 7 of the National Design Specifications for wood construction reference of anchor bolt placement.

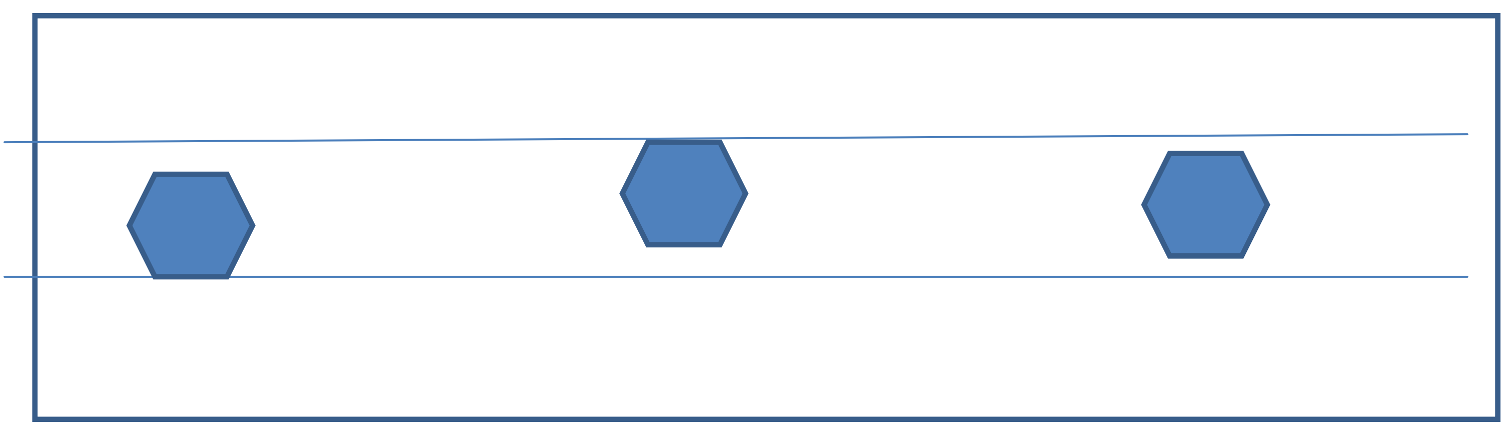
Spacing, Edge, and End Distance

The center-to-center distance along the grain should be at least four times the bolt diameter for parallel-to-grain loading. The minimum center-to-center spacing of bolts in the across-the-grain direction for loads acting through metal side plates and parallel to the grain need only be sufficient to permit the tightening of the nuts. For wood side plates, the spacing is controlled by the rules applying to loads acting parallel to grain if the design load approaches the bolt-bearing capacity of the side plates. When the design load is less than the bolt-bearing capacity of the side plates, the spacing may be reduced below that required to develop their maximum capacity.

COMMON PLACEMENT OF BOLTS IN THE FIELD



PROPER PLACEMENT OF BOLTS WITH CODE CHANGE



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

R403.1.6-RB-MEDINA.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located ~~a minimum 1 ¾" from the plate's edge or~~ in the middle third of the plate~~'s edge~~. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

(Portions of code change not shown remain unchanged)

Committee Reason: Approval was based upon the proponent's published reason. The modification clarifies the location of the anchor bolt relative to the middle third of the plate.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Hope Medina, Cherry Hills Village, representing Colorado Code Consulting, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located in the middle third of the <u>width of the</u> plate. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).
3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).

Commenter's Reason: The addition of the word width was added to circumvent any misunderstandings of where the middle third of the plate is located

RB21913

Final Action: AS AM AMPC____ D

RB224-13
202

Proposed Change as Submitted

Table R404.1.1(1)

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates, Inc., representing self (skerr@jwa-se.com)

Revise as follows:

TABLE R404.1.1(1)
PLAIN MASONRY FOUNDATION WALLS

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT[c] (feet)	PLAIN MASONRY[a] MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes[b]		
		GW, GP, SW and SP	GM, GC, SM, SM-SC and ML	SC, MH, ML-CL and inorganic CL
5	4	6 solid[d] or 8	6 solid[d] or 8	6 solid[d] or 8
	5	6 solid[d] or 8	8	8
6	4	6 solid[d] or 8	6 solid[d] or 8	6 solid[d] or 8
	5	6 solid[d] or 8	8	10
	6	8	10	12
7	4	6 solid[d] or 8	8	8
	5	6 solid[d] or 8	10	10
	6	10	12	10 solid[d]
	7	12	10 solid[d]	12 solid[d]
8	4	6 solid[d] or 8	6 solid[d] or 8	8
	5	6 solid[d] or 8	10	12
	6	10	12	12 solid[d]
	7	12	12 solid[d]	Footnote e
	8	10 ~~solid~~grout[d]	12 ~~solid~~ grout[d]	Footnote e
9	4	6 ~~solid~~grout[d] or 8 solid[d] or 12	6 ~~solid~~grout[d] or 8 solid[d]	8 grout[d] or 10 solid[d]
	5	~~8~~ 6 grout[d] or 10 solid[d]	~~10~~8 grout[d] or 12 solid[d]	~~12~~8 grout[d]
	6	~~10~~ 8 grout[d] or 12 solid[d]	~~12~~10 grout[d]	~~12 solid~~10 grout[d]
	7	~~12~~ 10 grout[d]	~~12 solid~~10 grout[d]	12 grout~~Footnote e~~
	8	~~12 solid~~10 grout[d]	12 grout~~Footnote e~~	Footnote e
	9	12 grout~~Footnote e~~	Footnote e	Footnote e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 Pa.

a. Mortar shall be Type M or S and masonry shall be laid in running bond. Ungrouted hollow masonry units are permitted except where otherwise indicated.
b. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
c. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
d. Solid indicates solid masonry unit, grout indicates grouted hollow units~~ or solid masonry units~~.
e. Wall construction shall be in accordance with either Table R404.1.1(2), Table R404.1.1(3), Table 404.1.1(4), or a design shall be provided.

Reason: For plain masonry walls with a maximum height of 9 ft., all backfill depths, and 8ft. tall walls with 8ft. of backfill, the wall construction limitations of Table R404.1.1 (1) exceed the prescriptive requirements of TMS 402/ACI 530/ASCE 5 section 5.6.3 and

Table 5.6.3.1. For these specific walls, when analyzed in accordance with TMS 402/ACI 530/ASCE 5, using the allowable flexural tensile stresses in Table 2.2.3.2, the values shown in Table R404.1.1 (1) cannot be justified. The proposed change is to make the values shown in Table R404.1.1 (1) compliant with the prescriptive and analytical requirements of TMS 402/ACI 530/ASCE 5.

It should be noted that in Table R404.1.1 (1) footnote d currently lumps solid grouted hollow units with solid masonry units. However, in both TMS 402/ACI 530/ASCE 5 Tables 5.6.3.1 and 2.2.3.2 the limitations of solid units are less than those of solid grouted hollow units. Depending on the type of mortar, the capacity from Table 2.2.3.2 for solid units is either 62% or 40% the capacity of solid grouted hollow units.

With this proposal the IRC table for plain masonry wall will meet the requirements found in the referenced standard.

Cost Impact: The cost of construction for 8ft and 9ft tall plain masonry walls will slightly increase. The cost increase will primarily only impact the 8ft and 9ft walls where solid masonry units are currently specified.

R404.1.1(1)T-RB-KERR.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: There was no technical justification provided that there have been any wide spread failures of 8 ft or 9 ft hollow masonry walls.

Assembly Action: Approved as Submitted

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted.

RB228-13
R202, R404.1.3, R404.4

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when either of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top ~~or~~ <u>and</u> bottom.

R404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of ~~24~~ <u>48</u> inches (610 mm) of unbalanced fill<u>, or retaining walls exceeding 24 inches in height that resist lateral loads in addition to soil,</u> shall be designed <u>in accordance with accepted engineering practice</u> to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning

Revise definition as follows:

WALL, RETAINING. A wall not laterally supported at the top, that resists <u>only</u> lateral ~~soil~~ load<u>.</u> ~~and other imposed loads.~~

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

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language for when a design is required in Section R404.1.3 and retaining walls in Section R404.4.

Section R404.1.3 specifically requires that walls supporting more than 48 inches of unbalanced fill and not laterally supported require an engineered design. Section R404.4 addresses the same walls where they are not supported at the top but states that a design is required when the height of the unbalanced fill exceeds 24 inches. The two sections are in direct conflict. This proposal changes the trigger height in R404.4 to 48 inches to be consistent with other sections of the code.

In addition, this proposal clarifies, in R404.1.3 that the lateral support is required at the top **and** bottom. The definition of "WALL, RETAINING" is modified to be consistent with the intent of section R404.4. The type of wall addressed in R404.4 is a self-standing retaining wall that is not supported at the top and is laterally supported at the bottom against sliding and overturning by a factor of 1.5. This type of wall would typically be a site retaining wall where it is primarily resisting only lateral soil loads. The definition is modified to clarify that this type of wall is not intended to support structural loads. A similar wall that does support structural loads would be addressed by other sections.

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

R404.4-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: It is unclear whether the change would prohibit temporary bracing. There are inconsistencies within the text. The committee prefers the current definition of retaining wall.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of ~~24~~ 48 inches (610 mm) of unbalanced fill, or retaining walls exceeding 24 inches in height that resist lateral loads in addition to soil, shall be designed in accordance with accepted engineering practice to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning. This section shall not apply to foundation walls supporting buildings.

Commenter's Reason: The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. The original proposal specifically addressed conflicts and confusing language for when a design is required in Section R404.1.3 and retaining walls in Section R404.4.

Based on comments received, the proposed change to the language in section R404.1.3 may, in some cases, cause further confusion and misapplication. This public comment removes the proposed changes to that section and it will remain as it currently is in the 2012 code. This public comment replaces the original proposal and only modifies section R404.4 to be consistent with other provisions in the code that allow a concrete or masonry wall supporting not more than 48 inches of backfill to be constructed without an engineered design . If the wall resists lateral loads in addition to soil, such as vehicle surcharges and fences built on top of the wall that are subject to wind loads, the height of the unbalanced fill is then limited to 24 inches as currently stated in the code.

Also, in the original proposal there was a proposed modification to the definition of RETAINING WALL. This public comment removes the suggested change and leaves the definition as it currently exists.

At the Committee Action Hearings, there was a question raised about this proposal prohibiting temporary bracing. The concern is not germane to the proposed code revision. The code does not specify requirements or limitations on how structures are braced or supported during construction. Those specifications and requirement are specified and regulated by agencies or organizations whose specific purpose is for construction site and worker safety such as OSHA. Nothing is specified requiring or prohibiting temporary bracing or shoring during construction.

RB228-13

Final Action: AS AM AMPC____ D

RB236-13
R501.3

Proposed Change as Submitted

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies ~~located directly over a space~~ in dwellings protected throughout by an automatic sprinkler system in accordance with Section P2904~~,~~ or NFPA13D~~,~~. ~~or other approved equivalent sprinkler system.~~
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Reason: In several areas where the IRC is adopted, Section 501.3 Exception #1 "…or other approved equivalent sprinkler system." is interpreted to permit the dwelling unit to only have a partial residential sprinkler "system" installed in the unprotected ceiling space, i.e. only fire sprinklers in the basement ceiling. This was not the intent of the authors of this text in the previous code cycle.

A residential fire sprinkler system designed according to NFPA 13D and/or P2904 is considered "sprinklered throughout" and does not have criteria or rules for partial systems. When a partial system is installed, it would violate not only the standards for installation, but the very requirement that mandated the system in the first place, Exception #1 of Section 501.3.

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

R501.3-RB-HUGO.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that Section P2904 permits a partial system and other approved systems needs to be retained.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeffrey M. Hugo, CBO representing National Fire Sprinkler Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies in dwellings protected throughout by an automatic sprinkler system in accordance with Section P2904, ~~or~~ NFPA13D, <u>or other approved equivalent sprinkler system</u>.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
   3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
   3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Commenter's Reason: Sprinkler systems installed according to NFPA 13D and P2904 are intended to be installed throughout the dwelling unit. Both NFPA 13D and P2904 have areas that are exempt from sprinklers, but neither of these standards have any provisions or rules for partially installed systems, including a partial system protecting a lightweight floor system.

It is contrary to draft code language that directs a user to a standard that does not have the provisions for which the code language is requiring. For this section to offer an exception for an incomplete system is not an exception and this puts the code official, the jurisdiction, and more importantly the occupants in the home at risk.

This public comment retains the committee's desire to keep the "other approved equivalent sprinkler system" language.

RB236-13

Final Action: AS AM AMPC____ D

RB237-13
R501.3

Proposed Change as Submitted

Proponent: Sean DeCrane, Cleveland Division of Fire, representing Cleveland Division of Fire/ International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistant rated, shall be provided with a ½-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of the floor assembly can be unprotected when complying with the following:
   3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.
   3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, ~~or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: This author was the original proponent of the current language in the IRC and appreciates the assistance of the representatives from NAHB and the American Wood Council who worked hard to place this language in the code providing additional protection to the responding fire fighters and the residents occupying these occupancies.

Since passage of this language it has become apparent there is cause for concern in portions of the language. One serious concern that has been demonstrated through additional testing at Underwriters Laboratories involves the language in Exception 4 permitting the use of *other approved floor assemblies demonstrating equivalent fire performance*. While this language was placed in the body of the code its intent was to allow the equivalency for a protected floor assembly. The language in Exception 4 allows the equivalency to an unprotected floor assembly.

We also want to ask the question, demonstrating the equivalent performance by what Standard? If it is to the ASTM E 119 Standard the ICC-ES has already permitted a deviation from a true E 119 test. In recent hearings, despite testimony to the contrary and evidence that the decision was based on misrepresented numbers the ICC –ES permits the reduction of the applied load to 50% of the design load, submitted as AC 14. A proponent is also not required to test a full assembly; simply testing two joists would be permitted.

There is a great concern on the reduction of the applied load. Further testing completed at Underwriters Laboratories has demonstrated the importance the applied load and the misrepresentation of true performance under fire conditions. I have provided a link at the bottom where the UL Tests reports can be accessed in detail.

The results of the original UL furnace testing on the performance of lightweight floor systems was instrumental in demonstrating the concern on the lack of performance in fire conditions of specific engineered products. Just a short recap, with a modified load of 40 lb/ft² on two sides of the floor system and two 300 pound fire fighter mannequins' tests results demonstrated:

- Unprotected 2 x 10 Dimensional Lumber collapsed at 18:45.
- Unprotected 16" I-Joists collapsed at 6:03.
- The use of ½" gypsum wallboard as protection allowed the 2 x 10 Dimensional to collapse at 44:45.
- The use of ½" gypsum wallboard as protection allowed the 16" I-Joist to collapse at 26:45.

A substantial improvement was realized simply by adding the gypsum board.

Let us now review recent test results conducted in the ASTM E 119 Standard test furnace. This report was issued in 2011 prior to the ICC-ES hearing. In the follow up tests there was an attempt to replicate test results for consistency plus there had been discussions on how some of the floor systems were not tested to a true E 119 test standard of 100% design load. The question would be; how would the applied load impact the performance of the floor? As you can clearly realize below, the test load has a direct impact on time performance.

- A 16" I-Joist floor assembly unprotected with a full design load collapsed at 2:02, a full four minutes earlier than the previous test to a modified load;
- A 2 x 10 dimensional lumber floor assembly with a full design load collapsed at 7:00, a full eleven minute difference to a modified load;
- A potential "equivalent" floor protection system (Intumescent paint) was tested to a modified load (40 lb/ft² on two sides and fire fighters in the middle) collapsed at 8:40. We saw a reduction in performance with the full load applied to the 2 x 10 dimensional lumber. What is the true performance when subjected to a full load? We will not know as the equivalency requirements allow the reduce test parameters including small samplings. (Test report language and timeline are listed below).

"Experiment 5 examined an engineered I-joist floor assembly with a spray applied fire retardant coating and the modified loading configuration (Figure 61 and Figure 62). The floor assembly failed at 8:40 after ignition. Observations made during the experiment of the exposed and unexposed sides of the floor assembly are detailed in Table 17. The average furnace temperature during the experiment followed the standard curve closely until approximately 6 minutes when the floor system was involved in flames (Figure 63).

The furnace pressure and oxygen concentration measured in the furnace are presented in Figure 64 and Figure 65 respectively. The pressure remained between -0.3 in. w.c. and 0.6 in. w.c. but fluctuated around 0 for most of the experiment. The oxygen concentration fluctuated and then decreased to less than 5 % by 7 minutes and remained at or below that concentration until collapse." [1]See UL Report Fire Service Collapse Hazard Floor Furnace Experiments.

Exp. Time, Min:Sec	Surface Observations
1:15	Crackling could be heard and smoke was present at West edge.
2:00	More frequent crackling could be heard.
2:00	Too dark to seen in furnace.
3:10	Crackling and smoke ceased.
3:45	Crackling and smoke started again.
4:00	Material on joists began to lighten in color and started to crack.
4:15	More intense smoke and crackling was present.
4:45	Significant flaming could be seen from first two joist bays on the north end of the assembly.
5:10	Crackling continued.
6:00	Smoke from subfloor joints was present.
6:00	Joist orange in color and looked like charring wood.
6:45	Significant flaming over entire exposed surface.
7:00	Kneeling mannequin began to vibrate vertically.
7:30	Entire assembly began to deflect into the furnace.
7:30	Vision obscured by fall off material circulating throughout the furnace.
8:10	Larger vertical vibrations could be seen on both mannequins.
8:15	Noticeable deflection could be seen at the centerline of the assembly.
8:30	Joist webs started to burn through.
8:40	Structural failure.

In recent years the fire service has become concerned on the performance of "modern" lumber and the use of engineered trees to produce lumber in a shorter time frame. While the elimination of this code language does not address this concern it does require manufacturers to produce products that will be tested and compared to a protected floor assembly as opposed to an unprotected floor. There is currently a proposal to ICC-ES, at the time of this submission, AC 450, to consider the approval of the use of an intumescent product, eerily similar to the test parameters of Test #5. The previous approval of AC 14 now allows the reduced floor assembly and test load in the comparable.

As we have demonstrated the concern in allowing reduced test parameters to address equivalencies in structural floor systems. We believe we should be using equivalencies to meet protected floor systems. The other question we would like to present would be what is the expected equivalent performance? Is it the 2 x 10 dimensional lumber's performance to a 100% design load? We saw a test performance of seven minutes, very close to the performance time of lightweight systems in the original tests that moved the ICC membership to require the protection of these floor systems. This is a question yet to be truly answered by the current language and that is why the membership must remove the equivalency language in Exception 4.

Traditionally the International Residential Code has been a prescriptive code. While the intent of this code language was not to promote gypsum board specifically we must ensure any substitute for a known consistent protection feature be held to a comparative Standard of performance to ensure consistency and safety.
http://www.ul.com/global/documents/offerings/industries/buildingmaterials/fireservice/basementfires/2009%20NIST%20ARRA%20Appendix%20B%20-%20Fire%20Service%20Collapse%20Hazard%20Floor%20Furnace%20Experiments.pdf

[1.] Underwriters Laboratories,
http://www.ul.com/global/eng/pages/offerings/industries/buildingmaterials/fire/fireservice/smokeparticulates/

Cost Impact: This proposal may or may not increase costs depending on cost of equivalent product.

R501.3-RB-DECRANE.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee feels it is important to keep the requirement that permits approved assemblies with equivalency to 2x10 lumber.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Sean DeCrane, Cleveland Division of Fire, representing International Association of Fire Fighters, requests Approval as Submitted.

Commenter's Reason: We are requesting this proposal to be Approved As Submitted. Since this section was approved in the Residential Code there has been some question as to the equivalency that is required. We require the protection of the lightweight assemblies that have been demonstrated to fail early in fire conditions due to the dangers to the occupants of these homes and also the responding fire fighters.

The code requires the installation of gypsum board to protect the floor assemblies, not because of industry influence but rather it is a proven product that has demonstrated its performance in many tests and real conditions. We encourage other industries to develop products that can meet the equivalency performance. Additional products are coming to the marketplace as we speak. The challenge to the AHJ is to identify which products meet the equivalency performance requirements. By placing this language in Exception 4 it has caused some confusion for officials. Currently manufacturers can meet the equivalency performance by going through Chapter 1. This requires manufacturers to take the proper steps of going through a recognized Evaluation Service to have their product reviewed, judged and properly evaluated for performance.

Some may say this is common sense but there are individuals who have proposed products that can meet ASTM E 84 flame spread performances and advocate this E 84 performance as the equivalency of a load bearing test such as the ASTM E119/UL 263 test. There are also individuals who have proposed Engineering Evaluations advocating Metal Plated Connected Wood Truss performs the equal to dimensional lumber. This despite the poor performance of a 3 minute 58 second collapse time, from ignition, in a full scale test at UL and NIST sponsored test.

By removing the equivalency from Exception 4 and requiring manufacturers to achieve their equivalency through the performance requirements in Chapter 1 we can provide the proper guidance to local AHJ's who are looking for assistance in determining products that have truly been evaluated properly for performance claims and can be installed in the field.

Public Comment 2:

J. William Degnan, President, National Association of State Fire Marshals, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistant rated, shall be provided with a ½-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of the floor assembly can be unprotected when complying with the following:
    3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.
    3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension.
5. <u>Other approved floor assemblies demonstrating equivalent fire performance.</u>

Commenter's Reason: The committee disapproved the proposal because the committee felt "it is important to keep the requirement that permits approved assemblies with equivalency to 2X10 lumber".

The proponent pointed out to the committee that while the language had intended to allow an equivalency for a protected floor assembly, the exception in its present form allows the equivalency to an unprotected floor assembly. The proponent went further by pointing out the defects of the current language based on UL conducted tests but in spite of these tests, the committee felt that it was important to keep the requirement. If so, then this modification would correctly format the exception to cause the approval to be based on or compared to the charging section and not exception #4. Furthermore, as asked by the proponent, to what standard is the equivalency to 2X10 lumber to be determined?

RB237-13

Final Action: AS AM AMPC____ D

RB240-13
R501.3

Proposed Change as Submitted

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

Delete without substitution as follows:

~~**R501.3 Fire protection of floors.** Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a $^{1}/_{2}$-inch (12.7 mm) gypsum wallboard membrane, $^{5}/_{8}$-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.~~

~~**Exceptions:**~~

1. ~~Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.~~
2. ~~Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.~~
3. ~~Portions of floor assemblies can be unprotected when complying with the following:~~
   - ~~3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story~~
   - ~~3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.~~
4. ~~Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: The code reference is not needed as one of the exceptions of requiring the fire protection of floors is that an NFPA 13D system be installed. NFPA 13D systems are required by Section R313 of this code in all structures. Section R501.3 is not applicable and should be removed from the code to prevent confusion of what is required.

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

R501.3-RB-PETERSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this section should be retained. This section is needed where jurisdictions amend out the sprinkler requirements.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Thomas Peterson, Box Elder County, UT, representing self, requests Approval as Submitted.

Commenter's Reason: The committee's reason for disapproving this code change was because a jurisdiction "may" amend out the requirement for fire suppression systems. This code should not be written to require things that may cover what some jurisdictions may or may not amend out. We are opening Pandora's Box by allowing the code to have requirements "just in case" certain jurisdictions amend out a code requirement. If that many jurisdictions are amending out the requirement for fire suppression then maybe that needs to be removed instead. If that were the case then this section would make perfect sense.

RB240-13

Final Action: AS AM AMPC____ D

RB241-13
R502.1 (NEW), R502.1.1, R502.1.1.1, R502.1.2, R502.2.2 (NEW)

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R502.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

~~**R502.1**~~ **R502.1.1** ~~**Identification**~~**. Sawn Lumber.** ~~Load-bearing dimension~~ Sawn lumber ~~for joists, beams and girders~~ shall be identified by a grade *mark* of ~~a~~ an accredited lumber grading or inspection agency ~~that has been *approved* by~~ and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade *mark*, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

~~**R502.1.1**~~ **R502.1.1.1 Preservative-treated lumber.** Preservative treated dimension lumber shall also be identified as required by Section R317.2.

~~**R502.1.2 Blocking and subflooring.** Blocking shall be a minimum of utility grade lumber. Subflooring may be a minimum of utility grade lumber or No. 4 common grade boards.~~

R502.2.2 Blocking and subflooring. Blocking for fastening panel edges or fixures shall be a minimum of utility grade lumber. Subflooring shall be a minimum of utility grade lumber or No. 4 common grade boards. Fireblocking shall be of any grade lumber.

Reason: The change is intended to clarify the process by which lumber design values are certified and recognized in the code. The current process, which has been used since 1970, relies on the internationally recognized U.S. Department of Commerce Voluntary Product Standard PS20. Because the current format of the section can be incorrectly interpreted to place a number of wood products under the identification requirements of PS20, a new format is proposed that clearly states this standard is only for sawn lumber. The format proposed is nearly identical to what is used in Section 2302 of the International Building Code. Wood products other than sawn lumber have unique manufacturing standards, design value development, and quality control criteria. This new format clarifies that these other wood products must comply with specific product standards.

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

R502.1 (NEW)-RB-PITTS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels that proposed Section R502.2.2 would prohibit WSP for subflooring.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R502
WOOD FLOOR FRAMING

R502.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

R502.1.1 Sawn Lumber. Sawn lumber shall be identified by a grade *mark* of an accredited lumber grading or inspection agency and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade *mark*, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

R502.1.1.1 Preservative-treated lumber. Preservative treated dimension lumber shall also be identified as required by Section R317.2.

~~R502.1.3~~ <u>R502.1.1.2</u> End-jointed lumber. *Approved* end-jointed lumber identified by a grade *mark* conforming to Section R502.1 may be used interchangeably with solid-sawn members of the same species and grade. End-jointed lumber used in an assembly required elsewhere in this code to have a fire-resistance rating shall have the designation "Heat Resistant Adhesive" or "HRA" included in its grade mark.

~~R502.1.4~~ <u>R502.1.2</u> Prefabricated wood I-joists. Structural capacities and design provisions for prefabricated wood I-joists shall be established and monitored in accordance with ASTM D 5055.

~~R502.1.5~~ <u>R502.1.3</u> Structural glued laminated timbers. Glued laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1 and ASTM D 3737.

~~R502.1.6~~ <u>R502.1.4</u> Structural log members. Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade *mark* of an *approved* lumber grading or inspection agency. In lieu of a grade *mark* on the material, a certificate of inspection as to species and grade issued by a lumber-grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.

~~R502.1.7~~ <u>R502.1.5</u> Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D 5456.

RELOCATE THE FOLLOWING SECTION:

R502.2.2 Blocking and subflooring. Blocking for fastening panel edges or fix<u>t</u>ures shall be a minimum of utility grade lumber. Subflooring shall be a minimum of utility grade lumber<u>,</u> ~~or~~ No. 4 common grade boards<u>, or wood structural panels as specified in Section R503.2</u>. Fireblocking shall be of any grade lumber.

Commenter's Reason: RB241-13 was one of three proposals intended to be format changes to clarify the application of DOC PS20, and there was no intent to make technical changes in any of them. The other two proposals – RB269-13 and RB393-13 – were recommended for approval as submitted. However, the IRC Committee felt that the relocated Sec. R502.2.2 in RB241 ignored the use of wood structural panels for subflooring and recommended disapproval for that reason. The use of wood structural panels in subflooring is addressed in Sec. R503.2, and the text being relocated in our original proposal exists in the code today. However, to address the committee's concern and to avoid possible conflict, this public comment adds a reference to R503.2. It also corrects a typo in the word "fixtures."

RB241-13

Final Action: AS AM AMPC____ D

RB250-13

Table R502.5(1), Table R502.5(2), Table R802.4(1), Table R802.4(2), Table R802.5.1(1) through R802.5.1(8)

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

TABLE R502.5(1)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR EXTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir[~~b~~] and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.
a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine 2x4s. Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

TABLE R502.5(2)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR INTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir[~~b~~] and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine 2x4s. Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

Revise as follows:

TABLE R802.4(1)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#2	~~12-5~~ 11-10	19-6	25-8	Note a
	Southern pine	#3	~~11-6~~ 9-8	17-0	21-8	25-7
16	Southern pine	#2	~~11-3~~ 10-9	17-8	23-4	Note a

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Southern pine	#3	~~10-0~~ 8-5	14-9	18-9	22-2
19.2	Southern pine	#2	~~10-7~~ 10-2	16-8	21-11	Note a
	Southern pine	#3	~~9-1~~ 7-8	13-6	17-2	20-3
24	Southern pine	#2	~~9-10~~ 9-1	15-6	20-1	23-11
	Southern pine	#3	~~8-2~~ 6-10	12-0	15-4	18-1

(Portions of Table not shown remain unchanged)

TABLE R802.4(2)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#2	~~9-10~~ 9-1	15-6	20-1	23-11
	Southern pine	#3	~~8-2~~ 6-10	12-0	15-4	18-1
16	Southern pine	#2	~~8-11~~ 7-10	13-6	17-5	20-9
	Southern pine	#3	~~7-1~~ 5-11	10-5	13-3	15-8
19.2	Southern pine	#2	~~8-5~~ 7-2	12-3	15-10	18-11
	Southern pine	#3	~~6-5~~ 5-5	9-6	12-1	14-4
24	Southern pine	#2	~~7-8~~ 6-5	11-0	14-2	16-11
	Southern pine	#3	~~5-9~~ 4-10	8-6	10-10	12-10

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~10-10~~ 10-2	17-0	22-5	Note b	Note b	~~10-6~~ 8-9	15-1	19-5	23-2	Note b

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Southern Pine #3	~~9-1~~ 7-8	13-6	17-2	20-3	24-1	~~7-11~~ 6-8	11-8	14-10	17-6	20-11
16	Southern Pine #2	~~9-10~~ 8-9	15-1	19-5	23-2	Note b	~~9-1~~ 7-7	13-0	16-10	20-1	23-7
	Southern Pine #3	~~7-11~~ 6-8	11-8	14-10	17-6	20-11	~~6-10~~ 5-9	10-1	12-10	15-2	18-1
19.2	Southern Pine #2	~~9-3~~ 8-0	13-9	17-9	21-2	24-10	~~8-4~~ 6-11	11-11	15-4	18-4	21-6
	Southern Pine #3	~~7-3~~ 6-1	10-8	13-7	16-0	19-1	~~6-3~~ 5-3	9-3	11-9	13-10	16-6
24	Southern Pine #2	~~8-7~~ 7-2	12-3	15-10	18-11	22-2	~~7-5~~ 6-2	10-8	13-9	16-5	19-3
	Southern Pine #3	~~6-5~~ 5-5	9-6	12-1	14-4	17-1	~~5-7~~ 4-8	8-3	10-6	12-5	14-9

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(2)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling attached to rafters, L/∆ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~9-10~~ 9-5	15-6	20-5	Note b	Note b	~~9-10~~ 8-9	15-1	19-5	23-2	Note b
	Southern Pine #3	~~9-1~~ 7-8	13-6	17-2	20-3	24-1	~~7-11~~ 6-8	11-8	14-10	17-6	20-11
16	Southern Pine #2	~~8-11~~ 8-7	14-1	18-6	23-2	Note b	~~8-11~~ 7-7	13-0	16-10	20-1	23-7
	Southern Pine #3	~~7-11~~ 6-8	11-8	14-10	17-6	20-11	~~6-10~~ 5-9	10-1	12-10	15-2	18-1
19.2	Southern Pine #2	~~8-5~~ 8-0	13-3	17-5	21-2	24-10	~~8-4~~ 6-11	11-11	15-14	18-4	21-6
	Southern Pine #3	~~7-3~~ 6-1	10-8	13-7	16-0	19-1	~~6-3~~ 5-3	9-3	11-9	13-10	16-6
24	Southern Pine #2	~~7-10~~ 7-2	12-3	15-10	18-11	22-2	~~7-5~~ 6-2	10-8	13-9	16-5	19-3
	Southern Pine #3	~~6-5~~ 5-5	9-6	12-1	14-4	17-1	~~5-7~~ 4-8	8-3	10-6	12-5	14-9

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling not attached to rafters, L/∆ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)

12	Southern Pine #2	~~9-6~~ 8-5	14-5	18-8	22-3	Note b	~~9-0~~ 7-6	12-11	16-8	19-11	23-4
	Southern Pine #3	~~7-7~~ 6-4	11-2	14-3	16-10	20-0	~~6-9~~ 5-8	10-0	12-9	15-1	17-11
16	Southern Pine #2	~~8-7~~ 7-3	12-6	16-2	19-3	22-7	~~7-10~~ 6-6	11-2	14-5	17-3	20-2
	Southern Pine #3	~~6-7~~ 5-6	9-8	12-4	14-7	17-4	~~5-10~~ 4-11	8-8	11-0	13-0	15-6
19.2	Southern Pine #2	~~7-11~~ 6-8	11-5	14-9	17-7	20-7	~~7-1~~ 6-0	10-2	13-2	15-9	18-5
	Southern Pine #3	~~6-0~~ 5-0	8-10	11-3	13-4	15-10	~~5-4~~ 4-6	7-11	10-1	11-11	14-2
24	Southern Pine #2	~~7-1~~ 6-0	10-2	13-2	15-9	18-5	~~6-4~~ 5-4	9-2	11-9	14-1	16-6
	Southern Pine #3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-9~~ 4-0	7-1	9-0	10-8	12-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(4)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 50 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~8-0~~ 6-10	11-9	15-3	18-2	21-3	~~7-7~~ 6-4	10-11	14-1	16-10	19-9
	Southern Pine #3	~~6-2~~ 5-2	9-2	11-8	13-9	16-4	~~5-9~~ 4-10	8-5	10-9	12-9	15-2
16	Southern Pine #2	~~7-1~~ 6-0	10-2	13-2	15-9	18-5	~~6-7~~ 5-6	9-5	12-2	14-7	17-1
	Southern Pine #3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-11~~ 4-2	7-4	9-4	11-0	13-1
19.2	Southern Pine #2	~~6-6~~ 5-5	9-4	12-0	14-4	16-10	~~6-0~~ 5-0	8-8	11-2	13-4	15-7
	Southern Pine #3	~~4-11~~ 4-1	7-3	9-2	10-10	12-11	~~4-6~~ 3-10	6-8	8-6	10-1	12-0
24	Southern Pine #2	~~5-10~~ 4-10	8-4	10-9	12-10	15-1	~~5-5~~ 4-6	7-9	10-0	11-11	13-11
	Southern Pine #3	~~4-4~~ 3-8	6-5	8-3	9-9	11-7	~~4-1~~ 3-5	6-0	7-7	9-0	10-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(5)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~8-7~~ 8-3	13-6	17-10	22-3	Note b	~~8-7~~ 7-6	12-11	16-8	19-11	23-4
	Southern Pine #3	~~7-7~~ 6-4	11-2	14-3	16-10	20-0	~~6-9~~ 5-8	10-0	12-9	15-1	17-11

RAFTER SPACING (inches)	SPECIES AND GRADE		2x4 (10 psf)	2x6	2x8	2x10	2x12	2x4 (20 psf)	2x6	2x8	2x10	2x12
16	Southern Pine	#2	~~7-10~~ 7-3	12-3	16-2	19-3	22-7	~~7-10~~ 6-6	11-2	14-5	17-3	20-2
	Southern Pine	#3	~~6-7~~ 5-6	9-8	12-4	14-7	17-4	~~5-10~~ 4-11	8-8	11-0	13-0	15-6
19.2	Southern Pine	#2	~~7-4~~ 6-8	11-5	14-9	17-7	20-7	~~7-1~~ 6-0	10-2	13-2	15-9	18-5
	Southern Pine	#3	~~6-0~~ 5-0	8-10	11-3	13-4	15-10	~~5-4~~ 4-6	7-11	10-1	11-11	14-2
24	Southern Pine	#2	~~6-10~~ 6-0	10-2	13-2	15-9	18-5	~~6-4~~ 5-4	9-2	11-9	14-1	16-6
	Southern Pine	#3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-9~~ 4-0	7-1	9-0	10-8	12-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(6)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 50 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~7-3~~ 6-10	11-5	15-0	18-2	21-3	~~7-3~~ 6-4	10-11	14-1	16-10	19-9
	Southern Pine	#3	~~6-2~~ 5-2	9-2	11-8	13-9	16-4	~~5-9~~ 4-10	8-5	10-9	12-9	15-2
16	Southern Pine	#2	~~6-7~~ 6-0	10-2	13-2	15-9	18-5	~~6-7~~ 5-6	9-5	12-2	14-7	17-1
	Southern Pine	#3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~4-11~~ 4-2	7-4	9-4	11-0	13-1
19.2	Southern Pine	#2	~~6-2~~ 5-5	9-4	12-0	14-4	16-10	~~6-0~~ 5-0	8-8	11-2	13-4	15-7
	Southern Pine	#3	~~4-11~~ 4-1	7-3	9-2	10-10	12-11	~~4-6~~ 3-10	6-8	8-6	10-1	12-0
24	Southern Pine	#2	~~5-9~~ 4-10	8-4	10-9	12-10	15-1	~~5-5~~ 4-6	7-9	10-0	11-11	13-11
	Southern Pine	#3	~~4-4~~ 3-8	6-5	8-3	9-9	11-7	~~4-1~~ 3-5	6-0	7-7	9-0	10-18

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans[a]									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	~~7-1~~ 6-0	10-2	13-2	15-9	18-5	~~6-8~~ 5-7	9-7	12-5	14-10	17-5
	Southern Pine	#3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~5-1~~ 4-3	7-5	9-6	11-3	13-4
16	Southern Pine	#2	~~6-2~~ 5-2	8-10	11-5	13-7	16-0	~~5-10~~ 4-10	8-4	10-9	12-10	15-1

	Southern Pine #3	~~4-8~~ 3-11	6-10	8-9	10-4	12-3	~~4-4~~ 3-8	6-5	8-3	9-9	11-7
19.2	Southern Pine #2	~~5-7~~ 4-8	8-1	10-5	12-5	14-7	~~5-4~~ 4-5	7-7	9-10	11-9	13-9
	Southern Pine #3	~~4-3~~ 3-7	6-3	8-0	9-5	11-2	~~4-0~~ 3-4	5-11	7-6	8-10	10-7
24	Southern Pine #2	~~5-0~~ 4-3	7-3	9-4	11-1	13-0	~~4-9~~ 4-0	6-10	8-9	10-6	12-4
	Southern Pine #3	~~3-9~~ 3-2	5-7	7-1	8-5	10-0	~~3-7~~ 3-0	5-3	6-9	7-11	9-5

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans[a]									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	~~6-6~~ 6-0	10-2	13-2	15-9	18-5	~~6-6~~ 5-7	9-7	12-5	14-10	17-5
	Southern Pine #3	~~5-4~~ 4-6	7-11	10-1	11-11	14-2	~~5-1~~ 4-3	7-5	9-6	11-3	13-4
16	Southern Pine #2	~~5-11~~ 5-2	8-10	11-5	13-7	16-0	~~5-10~~	8-4	10-9	12-10	15-1
	Southern Pine #3	~~4-8~~ 3-11	6-10	8-9	10-4	12-3	~~4-4~~	6-5	8-3	9-9	11-7
19.2	Southern Pine #2	~~5-6~~ 4-8	8-1	10-5	12-5	14-7	~~5-4~~ 4-5	7-7	9-10	11-9	13-9
	Southern Pine #3	~~4-3~~ 3-7	6-3	8-0	9-5	11-2	~~4-0~~ 3-4	5-11	7-6	8-10	10-7
24	Southern Pine #2	~~5-0~~ 4-3	7-3	9-4	11-1	13-0	~~4-9~~ 4-0	6-10	8-9	10-6	12-4
	Southern Pine #3	~~3-9~~ 3-2	5-7	7-1	8-5	10-0	~~3-7~~ 3-0	5-3	6-9	7-11	9-5

(Portions of Table not shown remain unchanged)

Reason: New design values for 2x4 Southern Pine #2 and all lower grades (i.e. #3, Stud, Construction, Standard, and Utility) were certified by the American Lumber Standards Committee Board of Review (BOR) on January 11, 2012, and became effective on June 1, 2012. This proposed change to multiple tables of the IRC reflects lower spans resulting from the newly certified design values. It is anticipated the Board of Review will certify new design values for other widths and grades of southern pine in early 2013. The use of the phrase "no change" is intended to mean that, as of the January 3, 2013 code change deadline, there are no revisions to these table entries. Further, it is likely there will be changes affecting these entries during the time period of the Group B development cycle. If new design values are certified and there is time prior to the IRC Committee hearings, AWC will prepare a floor modification to amend all the affected spans. Alternatively, the revised span tables will be developed for consideration during the Final Action Hearings. Regardless, approval of these spans by the Committee will allow the greatest degree of flexibility to further modify the spans at the Final Action Hearings.

In October 2012, the ICC membership approved code changes S281-12 and S283-12. These changes established a link between changes made to span tables in the IRC to identical IBC span tables. Since design values for wider width southern pine lumber were not available for the IBC Group A development cycle, S281-12 and S283-12 instruct ICC staff to extract the appropriate tables from the 2015 IRC. This will ensure that the 2015 IBC and 2015 IRC have identical state-of-the-art spans for southern pine.

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

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

TABLE R502.5(1)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR EXTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine ~~2x4s~~. Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

TABLE R502.5(2)
GIRDER SPANS [a, b] AND HEADER SPANS [a, b] FOR INTERIOR BEARING WALLS
(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Spans are given in feet and inches.
b. No. 1 or better grade lumber shall be used for Southern Pine ~~2x4s.~~ Other tabulated values assume #2 grade lumber.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

Add the tables as follows:

TABLE R502.3.1(1)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential sleeping areas, live load = 30 psf, L/Δ= 360)[a]

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)
12	Southern pine	#1	~~12-0~~ 11-10	~~15-10~~ 15-7	~~20-3~~ 19-10	~~24-8~~ 24-2	~~12-0~~ 11-10	~~15-10~~ 15-7	~~20-3~~ 18-7	~~24-8~~ 22-0
	Southern pine	#2	~~11-10~~ 11-3	~~15-7~~ 14-11	~~19-10~~ 18-1	~~24-2~~ 21-4	~~11-10~~ 10-9	~~15-7~~ 13-8	~~18-7~~ 16-2	~~21-9~~ 19-1
	Southern pine	#3	~~10-5~~ 9-2	~~13-3~~ 11-6	15-8 14-0	~~18-8~~ 16-6	~~9-4~~ 8-2	~~11-11~~ 10-3	~~14-0~~ 12-6	~~16-8~~ 14-9
16	Southern pine	#1	~~10-11~~ 10-9	~~14-5~~ 14-2	~~18-5~~ 18-0	~~22-5~~ 21-4	~~10-11~~ 10-9	~~14-5~~ 13-9	~~17-11~~ 16-1	~~21-4~~ 19-1
	Southern pine	#2	~~10-9~~ 10-3	~~14-2~~ 13-3	~~18-0~~ 15-8	~~21-1~~ 18-6	~~10-5~~ 9-4	~~13-6~~ 11-10	~~16-1~~ 14-0	~~18-10~~ 16-6
	Southern pine	#3	~~9-0~~ 7-11	~~11-6~~ 10-10	~~13-7~~ 12-1	~~16-2~~ 14-4	~~8-1~~ 7-1	~~10-3~~ 8-11	~~12-2~~ 10-10	~~14-6~~ 12-10
19.2	Southern pine	#1	~~10-4~~ 10-1	~~13-7~~ 13-4	~~17-4~~ 16-5	~~21-1~~ 19-6	~~10-4~~ 9-11	~~13-7~~ 12-7	~~16-4~~ 14-8	~~19-6~~ 17-5
	Southern pine	#2	~~10-1~~ 9-6	~~13-4~~ 12-1	~~16-5~~ 14-4	~~19-3~~ 16-10	~~9-6~~ 8-6	~~12-4~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1
	Southern pine	#3	~~8-3~~ 7-3	~~10-6~~ 9-1	~~12-5~~ 11-0	~~14-9~~ 13-1	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8
24	Southern pine	SS	9-9	12-10	16-5	19-11	9-9	12-10	16-5	~~19-11~~ 19-8
	Southern pine	#1	~~9-7~~ 9-4	~~12-7~~ 12-4	~~16-1~~ 14-8	~~19-6~~ 17-5	~~9-7~~ 8-10	~~12-4~~ 11-3	~~14-7~~ 13-1	~~17-5~~ 15-7
	Southern pine	#2	~~9-4~~ 8-6	~~12-4~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1	~~8-6~~ 7-7	~~11-0~~ 9-8	~~13-1~~ 11-5	~~15-5~~ 13-6
	Southern pine	#3	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8	~~6-7~~ 5-9	~~8-5~~ 7-3	~~9-11~~ 8-10	~~11-10~~ 10-5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D_0, D_1 and D_2 shall be determined in accordance with Section R301.2.2.2.1.

(Portions of table not shown remain unchanged)

TABLE R502.3.1(2)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential living areas, live load = 40 psf, L/Δ = 360)[b]

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)
12	Southern pine	#1	~~10-11~~ 10-9	~~14-5~~ 14-2	~~18-5~~ 18-0	~~22-5~~ 21-11	~~10-11~~ 10-9	~~14-5~~ 14-2	~~18-5~~ 16-11	~~22-5~~ 20-1
	Southern pine	#2	~~10-9~~ 10-3	~~14-2~~ 13-6	~~18-0~~ 16-2	~~21-9~~ 19-1	~~10-9~~ 9-10	~~14-2~~ 12-6	~~16-11~~ 14-9	~~19-10~~ 17-5
	Southern pine	#3	~~9-4~~ 8-2	~~11-11~~ 10-3	~~14-0~~ 12-6	~~16-8~~ 14-9	~~8-6~~ 7-5	~~10-10~~ 9-5	~~12-10~~ 11-5	~~15-3~~ 13-6
16	Southern pine	#1	~~9-11~~ 9-9	~~13-1~~ 12-10	~~16-9~~ 16-1	~~20-4~~ 19-1	~~9-11~~ 9-9	~~13-1~~ 12-7	~~16-4~~ 14-8	~~19-6~~ 17-5
	Southern pine	#2	~~9-9~~ 9-4	~~12-10~~ 11-10	~~16-1~~ 14-0	~~18-10~~ 16-6	~~9-6~~ 8-6	~~12-4~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1
	Southern pine	#3	~~8-1~~ 7-1	~~10-3~~ 8-11	~~12-2~~ 10-10	~~14-6~~ 12-10	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8
19.2	Southern pine	#1	~~9-4~~ 9-2	~~12-4~~ 12-1	~~15-9~~ 14-8	~~19-2~~ 17-5	~~9-4~~ 9-0	~~12-4~~ 11-5	~~14-11~~ 13-5	~~17-9~~ 15-11
	Southern pine	#2	~~9-2~~ 8-6	~~12-1~~ 10-10	~~14-8~~ 12-10	~~17-2~~ 15-1	~~8-8~~ 7-9	~~11-3~~ 9-10	~~13-5~~ 11-8	~~15-8~~ 13-9
	Southern pine	#3	~~7-4~~ 6-5	~~9-5~~ 8-2	~~11-1~~ 9-10	~~13-2~~ 11-8	~~6-9~~ 5-11	~~8-7~~ 7-5	~~10-1~~ 9-0	~~12-1~~ 10-8
24	Southern pine	SS	8-10	11-8	14-11	18-1	8-10	11-8	14-11	~~18-1~~ 18-0
	Southern pine	#1	~~8-8~~ 8-6	~~11-5~~ 11-3	~~14-7~~ 13-1	~~17-5~~ 15-7	~~8-8~~ 8-1	~~11-3~~ 10-3	~~13-4~~ 12-0	~~15-11~~ 14-3
	Southern pine	#2	~~8-6~~ 7-7	~~11-0~~ 9-8	~~13-1~~ 11-5	~~15-5~~ 13-6	~~7-9~~ 7-0	~~10-0~~ 8-10	~~12-0~~ 10-5	~~14-0~~ 12-4
	Southern pine	#3	~~6-7~~ 5-9	~~8-5~~ 7-3	~~9-11~~ 8-10	~~11-10~~ 10-5	~~6-0~~ 5-3	~~7-8~~ 6-8	~~9-1~~ 8-1	~~10-9~~ 9-6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
Note: Check sources for availability of lumber in lengths greater than 20 feet.
a. End bearing length shall be increased to 2 inches.
b. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D_0, D_1, and D_2 shall be determined in accordance with Section R301.2.2.2.1.

(Portions of table not shown remain unchanged)

Revise the tables as follows:

TABLE R802.4(1)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~12-8~~ 12-5	~~19-11~~ 19-6	~~Note a~~ 25-8	Note a
	Southern pine	#2	~~12-5~~ 11-10	~~19-6~~ 18-8	~~25-8~~ 24-7	Note a
	Southern pine	#3	~~11-6~~ 10-1	~~17-0~~ 14-11	~~21-8~~ 18-9	~~25-7~~ 22-9
16	Southern pine	#1	~~11-6~~ 11-3	~~18-1~~ 17-8	~~23-10~~ 23-4	Note a
	Southern pine	#2	~~11-3~~ 10-9	~~17-8~~ 16-11	~~23-4~~ 21-7	~~Note a~~ 25-7
	Southern pine	#3	~~10-0~~ 8-9	~~14-9~~ 12-11	~~18-9~~ 16-3	~~22-2~~ 19-9
19.2	Southern pine	#1	~~10-10~~ 10-7	~~17-0~~ 16-8	~~22-5~~ 22-0	Note a

	Southern pine	#2	~~10-7~~ 10-2	~~16-8~~ 15-7	~~21-11~~ 19-8	~~Note a~~ 23-5
	Southern pine	#3	~~9-1~~ 8-0	~~13-6~~ 11-9	~~17-2~~ 14-10	~~20-3~~ 18-0
24	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 20-5	~~Note a~~ 24-0
	Southern pine	#2	~~9-10~~ 9-3	~~15-6~~ 13-11	~~20-1~~ 17-7	~~23-11~~ 20-11
	Southern pine	#3	~~8-2~~ 7-2	~~12-0~~ 10-6	~~15-4~~ 13-3	~~18-1~~ 16-1

Check sources for availability of lumber in lengths greater than 20 feet.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
a. Span exceeds 26 feet in length.

(Portions of table not shown remain unchanged)

TABLE R802.4(2)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 20-5	~~Note a~~ 24-0
	Southern pine	#2	~~9-10~~ 9-3	~~15-6~~ 13-11	~~20-1~~ 17-7	~~23-11~~ 20-11
	Southern pine	#3	~~8-2~~ 7-2	~~12-0~~ 10-6	~~15-4~~ 13-3	~~18-1~~ 16-1
16	Southern pine	#1	~~9-1~~ 8-11	~~14-4~~ 14-0	~~18-11~~ 17-9	~~23-1~~ 20-9
	Southern pine	#2	~~8-11~~ 8-0	~~13-6~~ 12-0	~~17-5~~ 15-3	~~20-9~~ 18-1
	Southern pine	#3	~~7-1~~ 6-2	~~10-5~~ 9-2	~~13-3~~ 11-6	~~15-8~~ 14-0
19.2	Southern pine	SS	8-9	13-9	~~18-1~~ 18-2	23-1
	Southern pine	#1	~~8-7~~ 8-5	~~13-6~~ 12-9	~~17-9~~ 16-2	~~21-1~~ 18-11
	Southern pine	#2	~~8-5~~ 7-4	~~12-3~~ 11-0	~~15-10~~ 13-11	~~18-11~~ 16-6
	Southern pine	#3	~~6-5~~ 5-8	~~9-6~~ 8-4	~~12-1~~ 10-6	~~14-4~~ 12-9
24	Southern pine	#1	~~8-0~~ 7-8	~~12-6~~ 11-5	~~15-10~~ 14-6	~~18-10~~ 16-11
	Southern pine	#2	~~7-8~~ 6-7	~~11-0~~ 9-10	~~14-2~~ 12-6	~~16-11~~ 14-9
	Southern pine	#3	~~5-9~~ 5-1	~~8-6~~ 7-5	~~10-10~~ 9-5	~~12-10~~ 11-5

Check sources for availability of lumber in lengths greater than 20 feet.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
a. Span exceeds 26 feet in length.

(Portions of table not shown remain unchanged)

TABLE R802.5.1(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load=20 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~11-1~~ 10-10	~~17-4~~ 17-0	~~22-11~~ 22-5	Note b	Note b	~~11-1~~ 10-6	~~17-3~~ 15-8	~~21-9~~ 19-10	~~25-10~~ 23-2	Note b
	Southern pine	#2	~~10-10~~ 10-4	~~17-0~~ 15-7	~~22-5~~ 19-8	~~Note b~~ 23-5	Note b	~~10-6~~ 9-0	~~15-1~~ 13-6	~~19-5~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10
	Southern pine	#3	~~9-1~~ 8-0	~~13-6~~ 11-9	~~17-2~~ 14-10	~~20-3~~ 18-0	~~24-1~~ 21-4	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6
16	Southern pine	SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	~~Note b~~ 25-7	Note b
	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 19-10	~~25-10~~ 23-2	Note b	~~10-0~~ 9-1	~~15-0~~ 13-7	~~18-10~~ 17-2	~~22-4~~ 20-1	~~Note b~~ 23-10

	Southern pine	#2	~~9-10~~ 9-0	~~15-1~~ 13-6	~~19-5~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10	~~9-1~~ 7-9	~~13-0~~ 11-8	~~16-10~~ 14-9	~~20-1~~ 17-6	~~23-7~~ 20-8
	Southern pine	#3	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6	~~6-10~~ 6-0	~~10-1~~ 8-10	~~12-10~~ 11-2	~~15-2~~ 13-6	~~18-1~~ 16-0
19.2	Southern pine	SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	~~19-11~~ 19-7	~~25-5~~ 23-4	Note b
	Southern pine	#1	~~9-5~~ 9-3	~~14-10~~ 14-3	~~19-7~~ 18-1	~~23-7~~ 21-2	~~Note b~~ 25-2	~~9-3~~ 8-4	~~13-8~~ 12-4	~~17-2~~ 15-8	~~20-5~~ 18-4	~~24-4~~ 21-9
	Southern pine	#2	~~9-3~~ 8-2	~~13-9~~ 12-3	~~17-9~~ 15-7	~~21-2~~ 18-6	~~24-10~~ 21-9	~~8-4~~ 7-1	~~11-11~~ 10-8	~~15-4~~ 13-6	~~18-4~~ 16-0	~~21-6~~ 18-10
	Southern pine	#3	~~7-3~~ 6-4	~~10-8~~ 9-4	~~13-7~~ 11-9	~~16-0~~ 14-3	~~19-1~~ 16-10	~~6-3~~ 5-6	~~9-3~~ 8-1	~~11-9~~ 10-2	~~13-10~~ 12-4	~~16-6~~ 14-7
24	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	~~14-1~~ 13-10	~~18-6~~ 17-6	~~22-11~~ 20-10	~~Note b~~ 24-8
	Southern pine	#1	~~8-9~~ 8-7	~~13-9~~ 12-9	~~17-9~~ 16-2	~~21-1~~ 18-11	~~25-2~~ 22-6	~~8-3~~ 7-5	~~12-3~~ 11-1	~~15-4~~ 14-0	~~18-3~~ 16-5	~~21-9~~ 19-6
	Southern pine	#2	~~8-7~~ 7-4	~~12-3~~ 11-0	~~15-10~~ 13-11	~~18-11~~ 16-6	~~22-2~~ 19-6	~~7-5~~ 6-4	~~10-8~~ 9-6	~~13-9~~ 12-1	~~16-5~~ 14-4	~~19-3~~ 16-10
	Southern pine	#3	~~6-5~~ 5-8	~~9-6~~ 8-4	~~12-1~~ 10-6	~~14-4~~ 12-9	~~17-1~~ 15-1	~~5-7~~ 4-11	~~8-3~~ 7-3	~~10-6~~ 9-1	~~12-5~~ 11-0	~~14-9~~ 13-1

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:

H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.

H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.

TABLE R802.5.1(2)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load=20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 20-5	Note b	Note b	~~10-0~~ 9-10	~~15-9~~ 15-6	~~20-10~~ 19-10	~~25-10~~ 23-2	Note b
	Southern pine	#2	~~9-10~~ 9-5	~~15-6~~ 14-9	~~20-5~~ 19-6	~~Note b~~ 23-5	Note b	~~9-10~~ 9-0	~~15-1~~ 13-6	~~19-5~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10
	Southern pine	#3	~~9-1~~ 8-0	~~13-6~~ 11-9	~~17-2~~ 14-10	~~20-3~~ 18-0	~~24-1~~ 21-4	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6
16	Southern pine	#1	~~9-1~~ 8-11	~~14-4~~ 14-1	~~18-11~~ 18-6	~~24-1~~ 23-2	Note b	~~9-1~~ 8-11	~~14-4~~ 13-7	~~18-10~~ 17-2	~~22-4~~ 20-1	~~Note b~~ 23-10
	Southern pine	#2	~~8-11~~ 8-7	~~14-1~~ 13-5	~~18-6~~ 17-1	~~23-2~~ 20-3	~~Note b~~ 23-10	~~8-11~~ 7-9	~~13-0~~ 11-8	~~16-10~~ 14-9	~~20-1~~ 17-6	~~23-7~~ 20-8
	Southern pine	#3	~~7-11~~ 6-11	~~11-8~~ 10-2	~~14-10~~ 12-10	~~17-6~~ 15-7	~~20-11~~ 18-6	~~6-10~~ 6-0	~~10-1~~ 8-10	~~12-10~~ 11-2	~~15-2~~ 13-6	~~18-1~~ 16-0
19.2	Southern pine	SS	8-9	13-9	~~18-1~~ 18-2	23-1	Note b	8-9	13-9	~~18-1~~ 18-2	23-1	Note b
	Southern pine	#1	~~8-7~~ 8-5	~~13-6~~ 13-3	~~17-9~~ 17-5	~~22-8~~ 21-2	~~Note b~~ 25-2	~~8-7~~ 8-4	~~13-6~~ 12-4	~~17-2~~ 15-8	~~20-5~~ 18-4	~~24-4~~ 21-9
	Southern pine	#2	~~8-5~~ 8-1	~~13-3~~ 12-3	~~17-5~~ 15-7	~~21-2~~ 18-6	~~24-10~~ 21-9	~~8-4~~ 7-1	~~11-11~~ 10-8	~~15-4~~ 13-6	~~18-4~~ 16-0	~~21-6~~ 18-10
	Southern pine	#3	~~7-3~~ 6-4	~~10-8~~ 9-4	~~13-7~~ 11-9	~~16-0~~ 14-3	~~19-1~~ 16-10	~~6-3~~ 5-6	~~9-3~~ 8-1	~~11-9~~ 10-2	~~13-10~~ 12-4	~~16-6~~ 14-7
24	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	~~21-6~~ 20-10	~~Note b~~ 24-8

	Southern pine	#1	~~8-0~~ 7-10	~~12-6~~ 12-3	~~16-6~~ 16-2	~~21-1~~ 18-11	~~25-2~~ 22-6	~~8-0~~ 7-5	~~12-3~~ 11-1	~~15-4~~ 14-0	~~18-3~~ 16-5	~~21-9~~ 19-6
	Southern pine	#2	~~7-10~~ 7-4	~~12-3~~ 11-0	~~15-10~~ 13-11	~~18-11~~ 16-6	~~22-2~~ 19-6	~~7-5~~ 6-4	~~10-8~~ 9-6	~~13-9~~ 12-1	~~16-5~~ 14-4	~~19-3~~ 16-10
	Southern pine	#3	~~6-5~~ 5-8	~~9-6~~ 8-4	~~12-1~~ 10-6	~~14-4~~ 12-9	~~17-1~~ 15-1	~~5-7~~ 4-11	~~8-3~~ 7-3	~~10-6~~ 9-1	~~12-5~~ 11-0	~~14-9~~ 13-1

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=30 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	~~Note b~~ 25-4	Note b
	Southern pine	#1	~~9-8~~ 9-6	~~15-2~~ 14-10	~~20-0~~ 19-0	~~24-9~~ 22-3	Note b	~~9-8~~ 9-0	~~14-10~~ 13-5	~~18-8~~ 17-0	~~22-2~~ 19-11	~~Note b~~ 23-7
	Southern pine	#2	~~9-6~~ 8-7	~~14-5~~ 12-11	~~18-8~~ 16-4	~~22-3~~ 19-5	~~Note b~~ 22-10	~~9-0~~ 7-8	~~12-11~~ 11-7	~~16-8~~ 14-8	~~19-11~~ 17-4	~~23-4~~ 20-5
	Southern pine	#3	~~7-7~~ 6-7	~~11-2~~ 9-9	~~14-3~~ 12-4	~~16-10~~ 15-0	~~20-0~~ 17-9	~~6-9~~ 5-11	~~10-0~~ 8-9	~~12-9~~ 11-0	~~15-1~~ 13-5	~~17-11~~ 15-10
16	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	~~18-6~~ 18-5	~~23-8~~ 21-11	~~Note b~~ 25-11
	Southern pine	#1	~~8-9~~ 8-7	~~13-9~~ 13-0	~~18-1~~ 16-6	~~21-5~~ 19-3	~~25-7~~ 22-10	~~8-8~~ 7-10	~~12-10~~ 11-7	~~16-2~~ 14-9	~~19-2~~ 17-3	~~22-10~~ 20-5
	Southern pine	#2	~~8-7~~ 7-6	~~12-6~~ 11-2	~~16-2~~ 14-2	~~19-3~~ 16-10	~~22-7~~ 19-10	~~7-10~~ 6-8	~~11-2~~ 10-0	~~14-5~~ 12-8	~~17-3~~ 15-1	~~20-2~~ 17-9
	Southern pine	#3	~~6-7~~ 5-9	~~9-8~~ 8-6	~~12-4~~ 10-8	~~14-7~~ 13-0	~~17-4~~ 15-4	~~5-10~~ 5-2	~~8-8~~ 7-7	~~11-0~~ 9-7	~~13-0~~ 11-7	~~15-6~~ 13-9
19.2	Southern pine	SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	~~17-5~~ 16-10	~~22-0~~ 20-0	~~25-9~~ 23-7
	Southern pine	#1	~~8-3~~ 8-0	~~13-0~~ 11-10	~~16-6~~ 15-1	~~19-7~~ 17-7	~~23-4~~ 20-11	~~7-11~~ 7-1	~~11-9~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8
	Southern pine	#2	~~7-11~~ 6-10	~~11-5~~ 10-2	~~14-9~~ 12-11	~~17-7~~ 15-4	~~20-7~~ 18-1	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2
	Southern pine	#3	~~6-0~~ 5-3	~~8-10~~ 7-9	~~11-3~~ 9-9	~~13-4~~ 11-10	~~15-10~~ 14-0	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6
24	Southern pine	SS	7-10	12-3	16-2	~~20-8~~ 20-0	~~25-1~~ 23-7	7-10	~~12-3~~ 11-10	~~16-2~~ 15-0	~~19-8~~ 17-11	~~23-0~~ 21-2
	Southern pine	#1	~~7-8~~ 7-1	~~11-9~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-1~~ 6-4	~~10-6~~ 9-6	~~13-2~~ 12-0	~~15-8~~ 14-1	~~18-8~~ 16-8
	Southern pine	#2	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-4~~ 5-5	~~9-2~~ 8-2	~~11-9~~ 10-4	~~14-1~~ 12-3	~~16-6~~ 14-6
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-9~~ 4-2	~~7-1~~ 6-2	~~9-0~~ 7-10	~~10-8~~ 9-6	~~12-8~~ 11-2

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.

TABLE R802.5.1(4)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=50 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	SS	8-4	~~13-0~~ 13-1	17-2	21-11	Note b	8-4	~~13-0~~ 13-1	17-2	~~21-11~~ 21-5	~~Note b~~ 25-3
	Southern pine	#1	~~8-2~~ 8-0	~~12-10~~ 12-3	~~16-10~~ 15-6	~~20-3~~ 18-2	~~24-1~~ 21-7	~~8-2~~ 7-7	~~12-6~~ 11-4	~~15-9~~ 14-5	~~18-9~~ 16-10	~~22-4~~ 20-0
	Southern pine	#2	~~8-0~~ 7-0	~~11-9~~ 10-6	~~15-3~~ 13-4	~~18-2~~ 15-10	~~21-3~~ 18-8	~~7-7~~ 6-6	~~10-11~~ 9-9	~~14-1~~ 12-4	~~16-10~~ 14-8	~~19-9~~ 17-3
	Southern pine	#3	~~6-2~~ 5-5	~~9-2~~ 8-0	~~11-8~~ 10-1	~~13-9~~ 12-3	~~16-4~~ 14-6	~~5-9~~ 5-0	~~8-5~~ 7-5	~~10-9~~ 9-4	~~12-9~~ 11-4	~~15-2~~ 13-5
16	Southern pine	SS	7-6	11-10	15-7	19-11	~~24-3~~ 23-7	7-6	11-10	15-7	~~19-11~~ 18-6	~~23-10~~ 21-10
	Southern pine	#1	~~7-5~~ 7-1	~~11-7~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-4~~ 6-7	~~10-10~~ 9-10	~~13-8~~ 12-5	~~16-2~~ 14-7	~~19-4~~ 17-3
	Southern pine	#2	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-7~~ 5-8	~~9-5~~ 8-5	~~12-2~~ 10-9	~~14-7~~ 12-9	~~17-1~~ 15-0
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-11~~ 4-4	~~7-4~~ 6-5	~~9-4~~ 8-1	~~11-0~~ 9-10	~~13-1~~ 11-7
19.2	Southern pine	SS	7-1	11-2	14-8	~~18-9~~ 18-3	~~22-10~~ 21-7	7-1	11-2	~~14-8~~ 14-2	~~18-7~~ 16-11	~~21-9~~ 20-0
	Southern pine	#1	~~7-0~~ 6-6	~~10-8~~ 9-8	~~13-5~~ 12-3	~~16-0~~ 14-4	~~19-1~~ 17-1	~~6-8~~ 6-0	~~9-11~~ 9-0	~~12-5~~ 11-4	~~14-10~~ 13-4	~~17-8~~ 15-9
	Southern pine	#2	~~6-6~~ 5-7	~~9-4~~ 8-4	~~12-0~~ 10-7	~~14-4~~ 12-6	~~16-10~~ 14-9	~~6-0~~ 5-2	~~8-8~~ 7-9	~~11-2~~ 9-9	~~13-4~~ 11-7	~~15-7~~ 13-8
	Southern pine	#3	~~4-11~~ 4-3	~~7-3~~ 6-4	~~9-2~~ 8-0	~~10-10~~ 9-8	~~12-11~~ 11-5	~~4-6~~ 4-0	~~6-8~~ 5-10	~~8-6~~ 7-4	~~10-1~~ 8-11	~~12-0~~ 10-7
24	Southern pine	SS	6-7	10-4	13-8	~~17-5~~ 16-4	~~21-0~~ 19-3	6-7	~~10-4~~ 10-0	~~13-8~~ 12-8	~~16-7~~ 15-2	~~19-5~~ 17-10
	Southern pine	#1	~~6-5~~ 5-10	~~9-7~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3	~~6-0~~ 5-5	~~8-10~~ 8-0	~~11-2~~ 10-2	~~13-3~~ 11-11	~~15-9~~ 14-1
	Southern pine	#2	~~5-10~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2	~~5-5~~ 4-7	~~7-9~~ 6-11	~~10-0~~ 8-9	~~11-11~~ 10-5	~~13-11~~ 12-3
	Southern pine	#3	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3	~~4-1~~ 3-6	~~6-0~~ 5-3	~~7-7~~ 6-7	~~9-0~~ 8-0	~~10-8~~ 9-6

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67

1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(5)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=30 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~8-9~~ 8-7	~~13-9~~ 13-6	~~18-2~~ 17-10	~~23-2~~ 22-3	Note b	~~8-9~~ 8-7	~~13-9~~ 13-5	~~18-2~~ 17-0	~~22-2~~ 19-11	~~Note b~~ 23-7
	Southern pine	#2	~~8-7~~ 8-3	~~13-6~~ 12-11	~~17-10~~ 16-4	~~22-3~~ 19-5	~~Note b~~ 22-10	~~8-7~~ 7-8	~~12-11~~ 11-7	~~16-8~~ 14-8	~~19-11~~ 17-4	~~23-4~~ 20-5
	Southern pine	#3	~~7-7~~ 6-7	~~11-2~~ 9-9	~~14-3~~ 12-4	~~16-10~~ 15-0	~~20-0~~ 17-9	~~6-9~~ 5-11	~~10-0~~ 8-9	~~12-9~~ 11-0	~~15-1~~ 13-5	~~17-11~~ 15-10
16	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	21-6	~~Note b~~ 25-11
	Southern pine	#1	~~8-0~~ 7-10	~~12-6~~ 12-3	~~16-6~~ 16-2	~~21-1~~ 19-3	~~25-7~~ 22-10	~~8-0~~ 7-10	~~12-6~~ 11-7	~~16-2~~ 14-9	~~19-2~~ 17-3	~~22-10~~ 20-5
	Southern pine	#2	~~7-10~~ 7-6	~~12-3~~ 11-2	~~16-2~~ 14-2	19-3 16-10	~~22-7~~ 19-10	~~7-10~~ 6-8	~~11-2~~ 10-0	~~14-5~~ 12-8	~~17-3~~ 15-1	~~20-2~~ 17-9
	Southern pine	#3	~~6-7~~ 5-9	~~9-8~~ 8-6	~~12-4~~ 10-8	~~14-7~~ 13-0	~~17-4~~ 15-4	~~5-10~~ 5-2	~~8-8~~ 7-7	~~11-0~~ 9-7	~~13-0~~ 11-7	~~15-6~~ 13-9
19.2	Southern pine	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-10	~~20-2~~ 20-0	~~24-7~~ 23-7
	Southern pine	#1	~~7-6~~ 7-4	~~11-9~~ 11-7	~~15-6~~ 15-1	~~19-7~~ 17-7	~~23-4~~ 20-11	~~7-6~~ 7-1	~~11-9~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8
	Southern pine	#2	~~7-4~~ 6-10	~~11-5~~ 10-2	~~14-9~~ 12-11	~~17-7~~ 15-4	~~20-7~~ 18-1	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2
	Southern pine	#3	~~6-0~~ 5-3	~~8-10~~ 7-9	~~11-3~~ 9-9	~~13-4~~ 11-10	~~15-10~~ 14-0	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6
24	Southern pine	SS	7-1	11-2	14-8	18-9	22-10	7-1	11-2	14-8	~~18-9~~ 17-11	~~22-10~~ 21-2
	Southern pine	#1	~~7-0~~ 6-10	~~10-11~~ 10-7	~~14-5~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-0~~ 6-4	~~10-6~~ 9-6	~~13-2~~ 12-0	~~15-8~~ 14-1	~~18-8~~ 16-8
	Southern pine	#2	~~6-10~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-4~~ 5-5	~~9-2~~ 8-2	~~11-9~~ 10-4	~~14-1~~ 12-3	~~16-6~~ 14-6
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-9~~ 4-2	~~7-1~~ 6-2	~~9-0~~ 7-10	~~10-8~~ 9-6	~~12-8~~ 11-2

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:

H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.
b. Span exceeds 26 feet in length.

TABLE R802.5.1(6)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=50 psf, ceiling attached to rafters, L/∆ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#1	~~7-5~~ 7-3	~~11-7~~ 11-5	~~15-4~~ 15-0	~~19-7~~ 18-2	~~23-9~~ 21-7	~~7-5~~ 7-3	~~11-7~~ 11-4	~~15-4~~ 14-5	~~18-9~~ 16-10	~~22-4~~ 20-0
	Southern pine	#2	~~7-3~~ 6-11	~~11-5~~ 10-6	~~15-0~~ 13-4	~~18-2~~ 15-10	~~21-3~~ 18-8	~~7-3~~ 6-6	~~10-11~~ 9-9	~~14-1~~ 12-4	~~16-10~~ 14-8	~~19-9~~ 17-3
	Southern pine	#3	~~6-2~~ 5-5	~~9-2~~ 8-0	~~11-8~~ 10-1	~~13-9~~ 12-3	~~16-4~~ 14-6	~~5-9~~ 5-0	~~8-5~~ 7-5	~~10-9~~ 9-4	~~12-9~~ 11-4	~~15-2~~ 13-5
16	Southern pine	SS	6-10	10-9	14-2	18-1	22-0	6-10	10-9	14-2	18-1	~~22-0~~ 21-10
	Southern pine	#1	~~6-9~~ 6-7	~~10-7~~ 10-4	~~13-11~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~6-9~~ 6-7	~~10-7~~ 9-10	~~13-8~~ 12-5	~~16-2~~ 14-7	~~19-4~~ 17-3
	Southern pine	#2	~~6-7~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-7~~ 5-8	~~9-5~~ 8-5	~~12-2~~ 10-9	~~14-7~~ 12-9	~~17-1~~ 15-0
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~4-11~~ 4-4	~~7-4~~ 6-5	~~9-4~~ 8-1	~~11-0~~ 9-10	~~13-1~~ 11-7
19.2	Southern pine	SS	6-5	10-2	13-4	17-0	20-9	6-5	10-2	13-4	~~17-0~~ 16-11	~~20-9~~ 20-0
	Southern pine	#1	~~6-4~~ 6-2	~~9-11~~ 9-8	~~13-1~~ 12-3	~~16-0~~ 14-4	~~19-1~~ 17-1	~~6-4~~ 6-0	~~9-11~~ 9-0	~~12-5~~ 11-4	~~14-10~~ 13-4	~~17-8~~ 15-9
	Southern pine	#2	~~6-2~~ 5-7	~~9-4~~ 8-4	~~12-0~~ 10-7	~~14-4~~ 12-6	~~16-10~~ 14-9	~~6-0~~ 5-2	~~8-8~~ 7-9	~~11-2~~ 9-9	~~13-4~~ 11-7	~~15-7~~ 13-8
	Southern pine	#3	~~4-11~~ 4-3	~~7-3~~ 6-4	~~9-2~~ 8-0	~~10-10~~ 9-8	~~12-11~~ 11-5	~~4-6~~ 4-0	~~6-8~~ 5-10	~~8-6~~ 7-4	~~10-1~~ 8-11	~~12-0~~ 10-7
24	Southern pine	SS	6-0	9-5	12-5	15-10	19-3	6-0	9-5	12-5	~~15-10~~ 15-2	~~19-3~~ 17-10
	Southern pine	#1	~~5-10~~ 5-9	~~9-3~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3	~~5-10~~ 5-5	~~8-10~~ 8-0	~~11-2~~ 10-2	~~13-3~~ 11-11	~~15-9~~ 14-1
	Southern pine	#2	~~5-9~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2	~~5-5~~ 4-7	~~7-9~~ 6-11	~~10-0~~ 8-9	~~11-11~~ 10-5	~~13-11~~ 12-3
	Southern pine	#3	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3	~~4-1~~ 3-6	~~6-0~~ 5-3	~~7-7~~ 6-7	~~9-0~~ 8-0	~~10-8~~ 9-6

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

TABLE R802.5.1(7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum Rafter Spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	SS	7-5	11-8	15-4	19-7	~~23-10~~ 23-7	7-5	11-8	15-4	~~19-7~~ 18-10	~~23-10~~ 22-3
	Southern pine	#1	~~7-3~~ 7-1	~~11-5~~ 10-7	~~14-9~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~7-3~~ 6-9	~~11-1~~ 10-0	~~13-11~~ 12-8	~~16-6~~ 14-10	~~19-8~~ 17-7
	Southern pine	#2	~~7-1~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-8~~ 5-9	~~9-7~~ 8-7	~~12-5~~ 10-11	~~14-10~~ 12-11	~~17-5~~ 15-3
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~5-1~~ 4-5	~~7-5~~ 6-6	~~9-6~~ 8-3	~~11-3~~ 10-0	~~13-4~~ 11-10
16	Southern pine	SS	6-9	10-7	14-0	~~17-10~~ 17-4	~~21-8~~ 20-5	6-9	10-7	~~14-0~~ 13-9	~~17-10~~ 16-4	~~21-0~~ 19-3
	Southern pine	#1	~~6-7~~ 6-2	~~10-2~~ 9-2	~~12-9~~ 11-8	~~15-2~~ 13-8	~~18-1~~ 16-2	~~6-5~~ 5-10	~~9-7~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3
	Southern pine	#2	~~6-2~~ 5-3	~~8-10~~ 7-11	~~11-5~~ 10-0	~~13-7~~ 11-11	~~16-0~~ 14-0	~~5-10~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2
	Southern pine	#3	~~4-8~~ 4-1	~~6-10~~ 6-0	~~8-9~~ 7-7	~~10-4~~ 9-2	~~12-3~~ 10-10	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3
19.2	Southern pine	SS	6-4	10-0	13-2	~~16-9~~ 15-10	~~20-4~~ 18-8	6-4	~~10-0~~ 9-10	~~13-2~~ 12-6	~~16-5~~ 14-11	~~19-2~~ 17-7
	Southern pine	#1	~~6-3~~ 5-8	~~9-3~~ 8-5	~~11-8~~ 10-8	~~13-10~~ 12-5	~~16-6~~ 14-9	~~5-11~~ 5-4	~~8-9~~ 7-11	~~11-0~~ 10-0	~~13-1~~ 11-9	~~15-7~~ 13-11
	Southern pine	#2	~~5-7~~ 4-10	~~8-1~~ 7-3	~~10-5~~ 9-2	~~12-5~~ 10-10	~~14-7~~ 12-9	~~5-4~~ 4-6	~~7-7~~ 6-10	~~9-10~~ 8-8	~~11-~~9 10-3	~~13-9~~ 12-1
	Southern pine	#3	~~4-3~~ 3-8	~~6-3~~ 5-6	~~8-0~~ 6-11	~~9-5~~ 8-4	~~11-2~~ 9-11	~~4-~~0 3-6	~~5-11~~ 5-2	~~7-6~~ 6-6	~~8-10~~ 7-11	~~10-7~~ 9-4
24	Southern pine	SS	5-11	9-3	~~12-2~~ 11-11	~~15-7~~ 14-2	~~18-2~~ 16-8	5-11	~~9-3~~ 8-10	~~12-2~~ 11-2	~~14-8~~ 13-4	~~17-2~~ 15-9
	Southern pine	#1	~~5-7~~ 5-0	~~8-3~~ 7-6	~~10-5~~ 9-6	~~12-5~~ 11-1	~~14-9~~ 13-2	~~5-3~~ 4-9	~~7-10~~ 7-1	~~9-10~~ 9-0	~~11-8~~ 10-6	~~13-11~~ 12-5
	Southern pine	#2	~~5-0~~ 4-4	~~7-3~~ 6-5	~~9-4~~ 8-2	~~11-1~~ 9-9	~~13-0~~ 11-5	~~4-9~~ 4-1	~~6-10~~ 6-1	~~8-9~~ 7-9	~~10-6~~ 9-2	~~12-4~~ 10-9
	Southern pine	#3	~~3-9~~ 3-4	~~5-7~~ 4-11	~~7-1~~ 6-2	~~8-5~~ 7-6	~~10-0~~ 8-10	~~3-7~~ 3-1	~~5-3~~ 4-7	~~6-9~~ 5-10	~~7-11~~ 7-1	~~9-5~~ 8-4

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
		Maximum rafter spans[a]									

			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Southern pine	#1	~~6-7~~ 6-6	~~10-5~~ 10-2	~~13-8~~ 13-5	~~17-6~~ 15-9	~~20-11~~ 18-8	~~6-7~~ 6-6	~~10-5~~ 10-0	~~13-8~~ 12-8	~~16-6~~ 14-10	~~19-8~~ 17-7
	Southern pine	#2	~~6-6~~ 6-1	~~10-2~~ 9-2	~~13-2~~ 11-7	~~15-9~~ 13-9	~~18-5~~ 16-2	~~6-6~~ 5-9	~~9-7~~ 8-7	~~12-5~~ 10-11	~~14-10~~ 12-11	~~17-5~~ 15-3
	Southern pine	#3	~~5-4~~ 4-8	~~7-11~~ 6-11	~~10-1~~ 8-9	~~11-11~~ 10-7	~~14-2~~ 12-6	~~5-1~~ 4-5	~~7-5~~ 6-6	~~9-6~~ 8-3	~~11-3~~ 10-0	~~13-4~~ 11-10
16	Southern pine	SS	6-1	9-7	12-8	16-2	19-8	6-1	9-7	12-8	16-2	~~19-8~~ 19-3
	Southern pine	#1	~~6-0~~ 5-11	~~9-5~~ 9-2	~~12-5~~ 11-8	~~15-2~~ 13-8	~~18-1~~ 16-2	~~6-0~~ 5-10	~~9-5~~ 8-8	~~12-0~~ 11-0	~~14-4~~ 12-10	~~17-1~~ 15-3
	Southern pine	#2	~~5-11~~ 5-3	~~8-10~~ 7-11	~~11-5~~ 10-0	~~13-7~~ 11-11	~~16-0~~ 14-0	~~5-10~~ 5-0	~~8-4~~ 7-5	~~10-9~~ 9-5	~~12-10~~ 11-3	~~15-1~~ 13-2
	Southern pine	#3	~~4-8~~ 4-1	~~6-10~~ 6-0	~~8-9~~ 7-7	~~10-4~~ 9-2	~~12-3~~ 10-10	~~4-4~~ 3-10	~~6-5~~ 5-8	~~8-3~~ 7-1	~~9-9~~ 8-8	~~11-7~~ 10-3
19.2	Southern pine	SS	5-9	9-1	11-11	15-3	18-6	5-9	9-1	11-11	~~15-3~~ 14-11	~~18-6~~ 17-7
	Southern pine	#1	~~5-8~~ 5-6	~~8-11~~ 8-5	~~11-8~~ 10-8	~~13-10~~ 12-5	~~16-6~~ 14-9	~~5-8~~ 5-4	~~8-9~~ 7-11	~~11-0~~ 10-0	~~13-1~~ 11-9	~~15-7~~ 13-11
	Southern pine	#2	~~5-6~~ 4-10	~~8-1~~ 7-3	~~10-5~~ 9-2	~~12-5~~ 10-10	~~14-7~~ 12-9	~~5-4~~ 4-6	~~7-7~~ 6-10	~~9-10~~ 8-8	~~11-9~~ 10-3	~~13-9~~ 12-1
	Southern pine	#3	~~4-3~~ 3-8	~~6-3~~ 5-6	~~8-0~~ 6-11	~~9-5~~ 8-4	~~11-2~~ 9-11	~~4-0~~ 3-6	~~5-11~~ 5-2	~~7-6~~ 6-6	~~8-10~~ 7-11	~~10-7~~ 9-4
24	Southern pine	SS	5-4	8-5	11-1	14-2	~~17-2~~ 16-8	5-4	8-5	11-1	~~14-2~~ 13-4	~~17-2~~ 15-9
	Southern pine	#1	~~5-3~~ 5-0	~~8-3~~ 7-6	~~10-5~~ 9-6	~~12-5~~ 11-1	~~14-9~~ 13-2	~~5-3~~ 4-9	~~7-10~~ 7-1	~~9-10~~ 9-0	~~11-8~~ 10-6	~~13-11~~ 12-5
	Southern pine	#2	~~5-0~~ 4-4	~~7-3~~ 6-5	~~9-4~~ 8-2	~~11-1~~ 9-9	~~13-0~~ 11-5	~~4-9~~ 4-1	~~6-10~~ 6-1	~~8-9~~ 7-9	~~10-6~~ 9-2	~~12-4~~ 10-9
	Southern pine	#3	~~3-9~~ 3-4	~~5-7~~ 4-11	~~7-1~~ 6-2	~~8-5~~ 7-6	~~10-0~~ 8-10	~~3-7~~ 3-1	~~5-3~~ 4-7	~~6-9~~ 5-10	~~7-11~~ 7-1	~~9-5~~ 8-4

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

(Portions of table not shown remain unchanged)

H_C/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/10 or less	1.00

where:
H_C = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

Committee Reason: Approval was based upon the proponent's published reason. The modifications updated the span tables for southern pine based on the current design values certified by the American Lumber Standards Committee Board of Review.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

TABLE R502.3.1(1)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential sleeping areas, live load = 30 psf, L/Δ = 360)[a]

JOIST SPACING (inches)	**SPECIES AND GRADE**		**DEAD LOAD = 10psf**
			2 x 8
			Maximum floor joist spans
			(ft – in)
16	Southern pine	#3	~~10-10~~ 10-0

(Portions of Table not shown remain unchanged)

Commenter's Reason: This public comment corrects a typo in our original proposal.

RB250-13
Final Action: AS AM AMPC____ D

RB262-13
R507.2.3, Figure R507.2.3(2) (NEW)

Proposed Change as Submitted

Proponent: Hoyt Jeter, Eagle Eye Consulting Engineers, representing Washington Association of Building Officials Technical Code Development Committee (hoytjeter@centurytel.net)

Revise as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figures R507.2.3(1) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure 507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N). Where the lateral load connections is provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than 4 locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

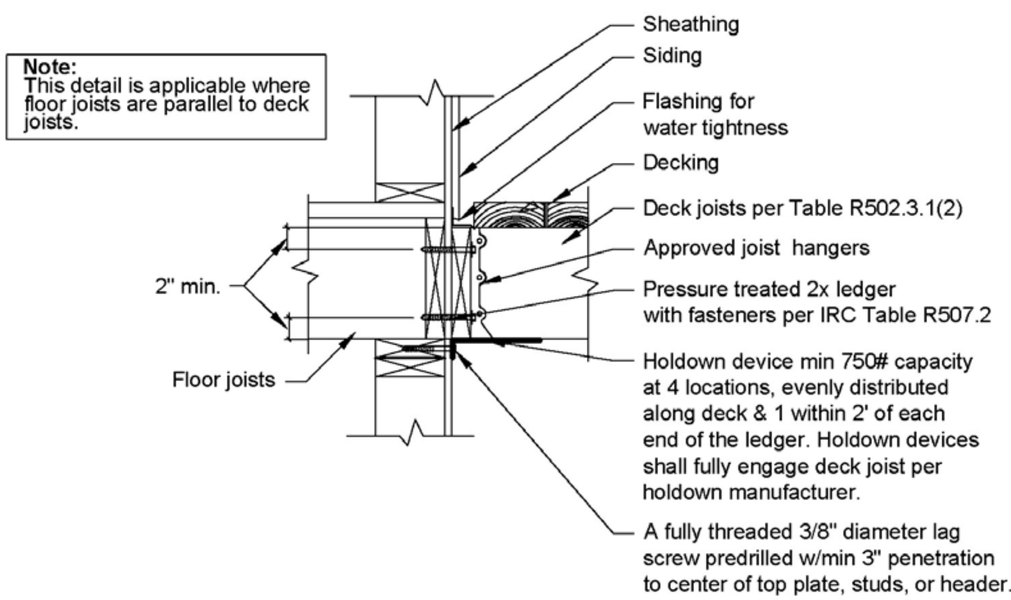


FIGURE R507.2.3(2)

Reason: This proposal provides an alternative prescriptive method to achieve an acceptable lateral load connection for residential decks. For new or replacement decks on existing homes, builders or homeowners must often remove interior sheet rock on ceilings in order to install hold-down tension devices as required by Figure 507.2.3. This proposal achieves an acceptable lateral load connection between the deck and primary structure by permitting the installation of surface mounted hold-down connection devices spread out along the length of the ledger and precludes the need to make expensive and unnecessary ceiling repairs.

Typical deck failures occur because joists separate from the joist-hangers which are fastened to the ledger. This is due to the lack of an adequate tension connection between the joist and the hanger at this joint. This proposal provides a better connection between at least 4 joists and the primary structure thereby reducing the potential failure of the joist to joist-hanger connection and better support form complete collapse of the deck and will reduce the chance of injury.

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

R507.2.3 #3-JETER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Lee J. Kranz, City of Bellevue, Development Services, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

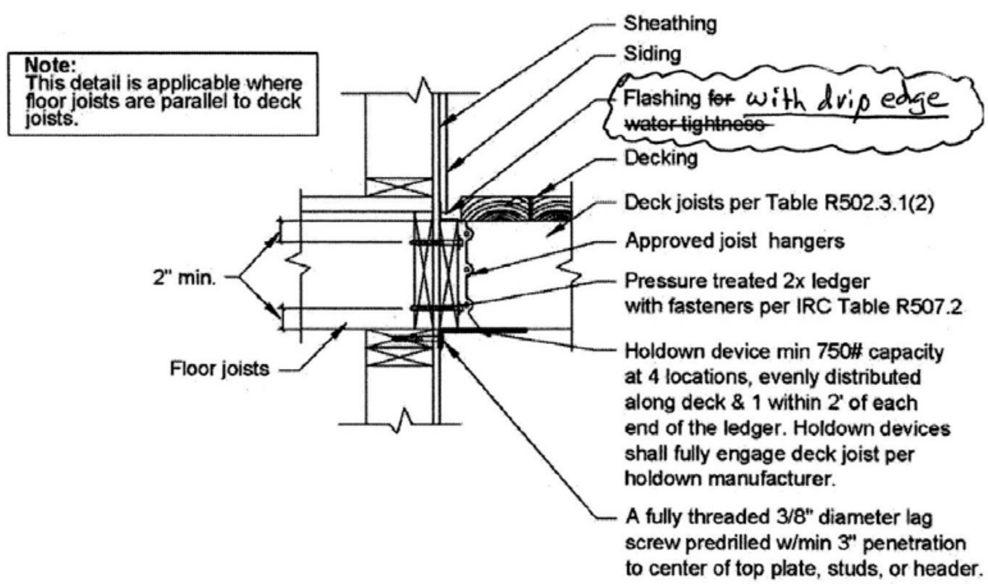


FIGURE R507.2.3(2)

(Portions of Code Change Proposal not shown remain unchanged)

Commenter's Reason: The attached modification was discussed in Dallas by the IRC Building Committee as part of the testimony related to the RB-262 code change proposal and received favorable responses from members of the Committee. After hearing testimony on the floor modification and the original proposal the Committee voted to endorse RB262 and it was approved as submitted. Subsequent to the final vote it was noted that the modification should have been included in the motion but was not. The Committee Chair suggested that a public comment be submitted to have it added to the original proposal.

The modification changes the original proposal slightly to require that the deck ledger flashing to have a drip edge to divert moisture away from the ledger.

Public Comment 2:

Glenn Mathewson, MCP, City of Westminster, CO, representing North American Deck and Railing Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figures R507.2.3(1) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure 507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N). Where the lateral load connections is provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than 4 locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

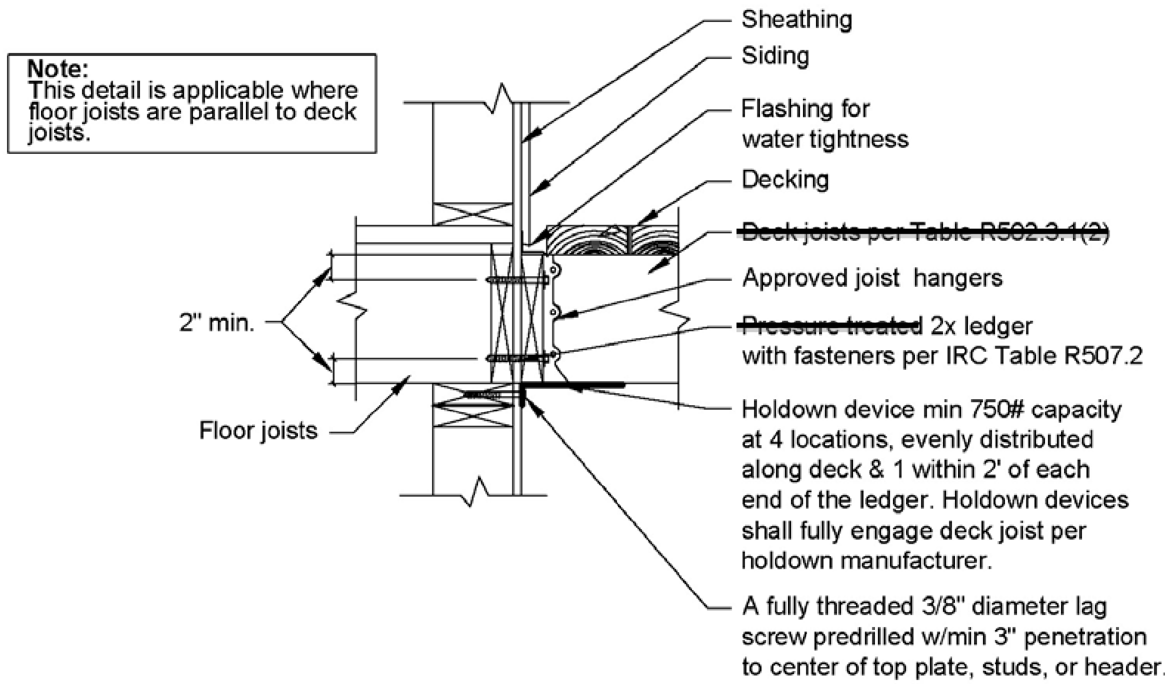


FIGURE R507.2.3(2)

RB262-13

Final Action: AS AM AMPC____ D

RB263-13
R507.1, R507.2.3, Figure R507.2.3

<u>Proposed Change as Submitted</u>

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

Revise as follows:

R507.1 Decks. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads.

> <u>**Exception:** Design for lateral loads, and connectors in accordance with Section R507.3, shall not be required for decks that do not require guards in accordance with Section R312.1.1, provided that the deck ledger is connected to the band joist in accordance with Section R507.2.</u>

Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

~~R507.2.3~~ <u>R507.3</u> Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.~~2.~~3. Where the lateral load connection is provided in accordance with figure 507.~~2.~~3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

FIGURE ~~507.2.3~~ <u>507.3</u>
DECK ATTACHMENT FOR LATERAL LOADS

(Figure remains unchanged)

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

The provisions for deck design and attachment to the house have evolved in recent years. The IRC is now very strong on appropriate attachment to the main structure, as it should be. However, the specific provision in R507.1 that requires design for lateral loads, and the prescriptive hold-down tension connector alternative of R507.2.3, seem overly conservative for decks that are at grade, when these decks do not even require guardrails. For at-grade decks, the lag screw/bolt connections from deck ledger to band joist required by R507.2 are adequate. Elevated decks would still be required to be designed for lateral loads in accordance with R507.1 or the prescriptive hold-down tension devices specified in R507.2.3 (figure included below for convenience).

The renumbering of current Section R507.2.3 to R507.3 is necessary because current Section R507.2.3 serves as a prescriptive alternative to the requirement for design for lateral loads in R507.1. The purpose of the exception is to retain the requirement for ledger-to-band joist lags or bolts in current R507.2, R507.2.1, and R507.2.2, but exempt low decks from the prescriptive hold-down tension devices (or design for lateral load) in current section R507.2.3. Moving current R507.2.3 to its own section allows easier reference to the lag/screw connection requirements.

Cost Impact: The code change proposal could reduce the cost of construction. It could reduce the cost of construction.

R507.1-RB-BAJNAI-BCAC.doc

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Submitted**

Committee Reason: This is a needed exception for decks without guards. This allows decks without guards to be attached without the lateral hold downs.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Glenn Mathewson, MCP, City of Westminster, CO, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.1 ~~Decks~~ General. Decks shall be designed in accordance with this section and accepted engineering practice to resist both vertical and lateral loads as required by Section R301.1. Ledger connections to exterior walls shall not be made to any wall cladding or veneers and shall be made to the primary structure. ~~Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads.~~

> ~~**Exception:** Design for lateral loads, and connectors in accordance with Section R507.3, shall not be required for decks that do not require guards in accordance with Section R312.1.1, provided that the deck ledger is connected to the band joist in accordance with Section R507.2.~~

Such ~~attachment~~ connection shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

~~**R507.3 Deck lateral load connection.** The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3. Where the lateral load connection is provided in accordance with figure 507.2.3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).~~

~~**Figure R507.2.3**~~
~~**Deck attachment for lateral loads.**~~

Commenter's Reason: As you consider this public comment modification, please review the additional information at the end that provides a better undesrstanding of the history and implications of the IRC lateral load provisions on the construction industry. Rather than only exempting low-level decks from lateral load connections as RB263 proposes, this public comments provides evidence that it's not required on most if not all decks.

In the summer of 2013, a month before this public comment was due, the Forest Products Society published an edition of Wood Design Focus containing research articles providing results from Washington State University and Virginia Tech regarding testing of decks for lateral loads. Seven years after the lateral load provisions were put in the IRC, only NOW we finally have real information. The following results of these tests provide the validated information the decking and code industry has been waiting for. While more research is necessary for a complete prescriptive lateral load design method in the IRC, the research to date is sufficient enough to prove that what has been in the IRC is a fallacy and must be removed. Quality structural provisions based on real data will be more appropriately developed for the 2018 with a clean slate. There is no justification and has never been any justification for building code, products or alternatives based on what is in the 2012 IRC for deck lateral loads.
The following quotes from this document are provided below under "fair use" permitted by the publisher, the Forest Products Society.

Wind Analysis from Washington State University.
To determine the effects of wind on typical deck construction, load calculations for a 12 x 12 deck 10 ft. above grade were performed. The following text is from this research report.

> "From the assumptions in the example, the largest ASD wind load was 1,299 lb using ASCE 7-10 methodology and data. The resulting hold-down force for a 12 ft by 12 ft deck would be approximately 650 lb. This load is smaller than the 1,500 lb hold-down requirement in the 2009 IRC, Section 502.2.2.3. From this analysis, the 1,500 lb minimum design capacity is conservatively high for wind lateral loads. An allowable design capacity of 650 lb would be sufficient to resist the wind lateral loads based on the assumptions and calculations given in this paper. Unless you are in a hurricane or special wind

region, the hold-down forces will be significantly smaller. Based on the above assumptions, the hold down forces would be approximately 266 lb."

According to the study of this deck, in a hurricane or special wind region, the lateral load developed at the connection device would be 650 lb. However, more common wind zones (i.e. the minimum standard) would only require a 266 lb design resistance. This is well below the 1500 lb currently in the IRC.

Seismic Analysis from Washington State University.
To determine the effects of seismic activity on typical deck construction, load calculations for a 12 x 12 deck 10 ft above grade were performed. The calculations and the resulting loads are based on seismic design category D. The following text is from this research report.

> "Based on our seismic analyses with the stated assumptions, and using the equivalent lateral load provisions in ASCE 7-10, hold-down requirements significantly lower than 1,500 lb can be justified when seismic loads govern. From our analyses, a maximum ASD-factored seismic load of 1,250 lb would be reasonable, resulting in hold-down requirements of approximately 625 lb. This can be achieved through a variety of hardware solutions."

Again, we will compare these values at the end of this report. To summarize, in a very high seismic region (D), only 625 lb. of load would require resistance. It is safe to assume it will be less for lower seismic regions. This is well below the 1500 lb currently in the IRC.

Lateral Load from Occupants Testing from Washington State University.
To determine the magnitude of lateral load that could be generated by the movement of occupants on a deck, tests were conducted on a full-scale deck with human subjects. The following text is from this research report.

> "The highest lateral load observed in all tests was 12.1 psf shown in Table 2. In this case, deck boards were oriented parallel to the deck ledger, resulting in a very flexible deck that swayed back and forth approximately 7 inches each way at a frequency of approximately 1 Hz. These large displacements caused significant inertial forces from the mass of the deck and also allowed the occupants to "feel" the deck movement, making it easier for them to synchronize their movements. As displacement of the deck reached maximum values of approximately 7 inches, the occupants started pivoting their hips (like downhill skiers) with the deck while leaving their upper body nearly motionless. At this point, it could be argued that the majority of the force generated is coming from deck inertial forces rather than from the occupants. This would imply that if lateral sway/acceleration of a deck is adequately restrained, these inertial forces could be reduced or eliminated. For example, when the cyclic motion was perpendicular to the deck ledger (the stiffest orientation), the maximum traction load was 4.5 psf. In summary it could be argued for the design that 12 psf would provide a reasonable upper estimate of lateral loads from occupants for flexible decks."

Let's look at some key parts of this information.

1) The test revealed that a 12 x12 deck loaded to 40psf with moving occupants, would experience approximately 7 inches maximum of displacement. This deflection is measured from the outer corner of the deck, at 12 ft from the ledger side of the deck. This is with perpendicular decking installed.
2) At the above described maximum expected deflection, the maximum load expected to be generated by the occupants is conservatively 12 psf.
3) It is important to note that this load is based on a deck built that allows sway up to 7 inches. Had the deck been designed appropriately, to resist such deformation, the researcher states the loads would be reduced.

Ledger Connection Testing by Virginia State.
The same researcher that conducted the ledger connection tests that were the basis of the ledger fastening table in the 2009 IRC performed this research. Two 12 x 12 decks were constructed identically with perpendicular decking. One deck had lateral hold down anchors installed, the other did not. The decks were fastened with a strut along the center of the 12 ft. joists spans to simulate the resultant location of a uniformly loaded deck. The decks were pulled laterally at this midpoint to a displacement of 17 inches, far greater than anything the occupants in the previously described test could generate. The following text from the research report describes the damage observed by these large loads.

> "In both tests, splitting of the top edges of the deck joists was the main source of damage, and was caused by the couple from the deck screws that induced stresses perpendicular to the grain. Splitting propagated along the longitudinal axis of the wood. Each deck joist completely split, to the depth of screw penetration, from the load drag strut to the ledger board. Significant yielding and fracture of deck board screws was also observed in this region. Minimal joist splitting and screw yielding was seen in the region from the load drag strut to the outer deck beam. In both tests, no damage was observed in the deck ledger to house rim board connection. A maximum separation of 0.1 inches when hold-downs were used and 0.15 inches when hold-downs were not used was recorded between the deck ledger and diaphragm rim board at the tension chord of the deck. No damage was observed in the simulated house diaphragm."

It is critical at this time to remember the original motivation for including the lateral load provisions in the 2009 IRC was the connection of the band joists to the house, as shown in the clip below:

Reason: Researchers at Virginia Tech University and Washington University have tested simulated deck-ledger to house-band-joist connections in their respective laboratories. A practical range of pressure-preservative-treated (PPT) deck ledger lumber (incised Hem-fir and Southern Pine) was attached to a simulated Spruce-Pine-Fir band joist by ½-inch lag screws or bolts with washers. The deck ledger was separated from the house band joist by placing a piece of 15/32" wall sheathing in the connection, and in another test case for bolts only, a ½-inch stack of washers was inserted into the connection to produce a drainage plane. The specimens were tested to failure and the average test results ware divided by a factor of 3.0, intended to provide an adequate in-service safety factor, and further divided by 1.6 to convert from a "test duration" to a "normal duration" of ten years recognized by the NDS and IBC as the proper duration for occupancy live load.

The proposed on-center spacing is the closest spacing for the two cases of deck ledger lumber studied. Due to the limited investigation into the performance of composite type house rimboards (only DFL was evaluated) and the possibility of rimboards entering the market being a lower quality than what was tested at Washington State University, engineered rimboards are not included in the scope of the proposed fastener spacing table. Instead, footnote 6 is proposed to refer the contractor and official to the manufacturer of the rimboard product. The two papers cited in the Bibliography gives the testing procedure and results for the cases included in the caption to the proposed table.

Bibliography:
1. Carradine, D. M., D. A. Bender, J. R. Loferski, and F. E. Woeste. 2005. Wood Bits: Residential deck ledger design. Building Safety Journal (6): 4-7. www.iccsafe.org/news/bsj/1205_Woodbits.pdf
2. Loferski, J., F. Woeste, R. Caudill, T. Platt, and Q. Smith. 2004. Load-tested deck ledger connections. Journal of Light Construction 22(6): 71-78

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

Committee Action: **Approved as Submitted**

Committee Reason: This is a much needed addition to the code and it brings in a new table that is a good starting point for the attachment of the deck ledger to the band joist. The committee urges additional study of the attachment of the band joist to the framing.

Assembly Action: **None**

2007 ICC FINAL ACTION AGENDA **445**

The committee reason in the clip above, approving the ledger fastening table, is provided below:

> "Committee Reason: This is a much needed addition to the and brings in a new table that is a good starting point of the attachment of the ledger to a band joist. The committee urges additional study of the attachment of the band joist to the framing."

The test above, by the original researcher of the ledger connection, reveals that no damage occurred to the simulated house diaphragm, even under the most maximum loads in the test and a 17 inch horizontal deflection that split the tops of the joists. The band joist attachment to the framing did not require any additional connection. Seven years later, the study has been provided.

Many have questioned, "Doesn't a ledger connected with lag screws resist at least some lateral load?" The following text is from the research report.

> "The two outermost lag screws in tension resisted most of the chord force and the sum of the forces in all the lag screws located in the tension region of the deck agree well with the calculated overturning tension force (Figure 6). Furthermore, even though the two outermost lag screws carried most of the force, these lag screws did not show any visible signs of withdrawal at a maximum load of approximately 7,000 lbs (Figure 5)"

According to the graph below from the research, the deck experienced a horizontal deflection at approximately 17 inches at a load just shy of 3500 lbs. However, when loading continued upwards of 7,000 lbs, "the lag screws did not show any visible signs of withdrawal". I think the answer is that lag screws do withstand lateral loads, and band joists don't get pulled from homes.

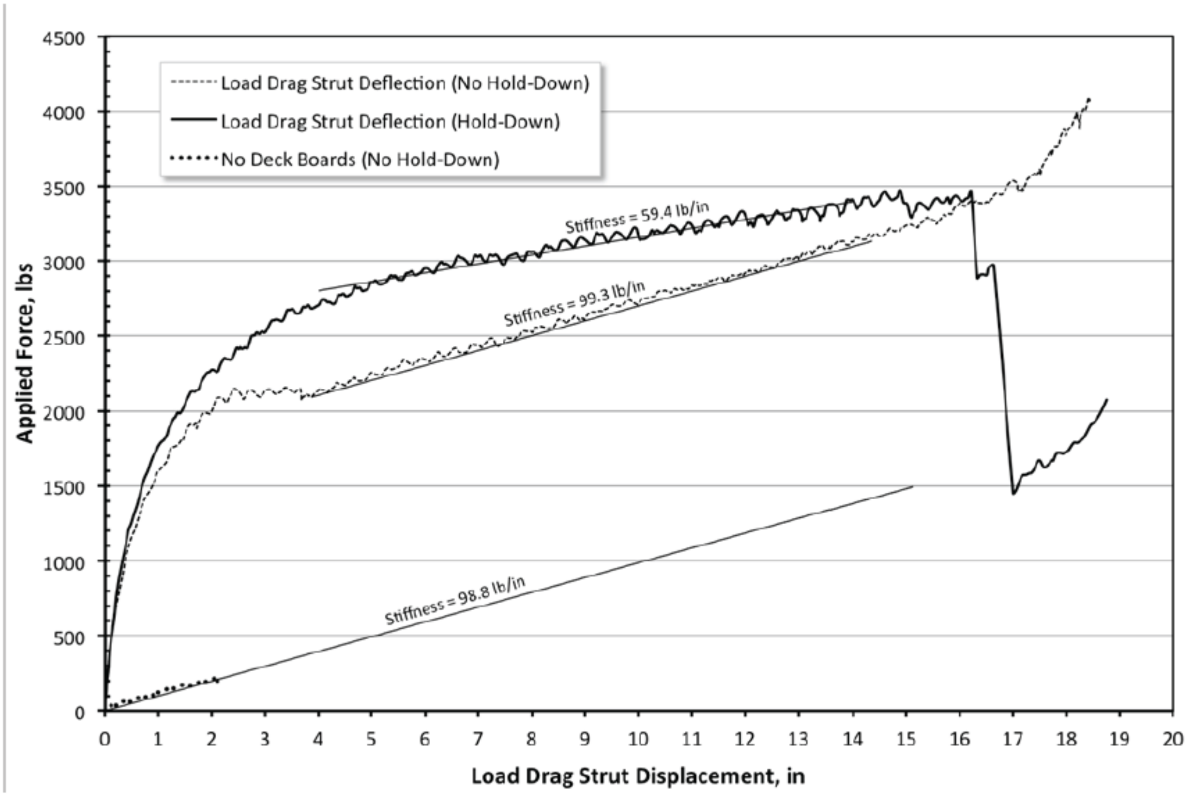


Figure 4. Load-Displacement Curves for Deck With and Without Hold-downs

There is still more to be said about the lateral load anchors and the ledger connection in this test. The following text is from this research report.

> "*Hold-down behavior and geometric effects.*--If the deck behaved as a rigid body, the tension chord forces can be calculated using simple statics as given in Equation 4.3-7 of the 2008 *Special Design Provisions for Wind and Seismic* (AF&PA, 2008), and are shown in Figure 7. However, due to the flexibility of the deck, the measured forces in the hold-down connectors were dramatically different than expected. <u>The hold-down expected to resist overturning tension forces actually diminished to zero as the deck deformed."</u>

The lateral load detail provided in the IRC with no structural basis, indeed…has no structural basis. It doesn't even work as intended and clearly doesn't belong in the IRC. The following text is from this research report.

> "Ledger attachment -- Deck ledgers were attached with 0.5-inch diameter lag screws in a staggered pattern as specified in IRC Table R502.2.2.1. The research basis for the IRC provisions was Carradine et al. (2007;; 2008). <u>The deck ledger-to-house attachment appeared to be adequate for the conditions studied. When no tension hold-down connectors were used, the outer two lag screws carried most of the withdrawal load with no visible signs of failure</u> (Figure 6). <u>Testing was terminated before an ultimate strength was achieved at a load of approximately 7,000 lb for both decks. The two lag screws nearest the deck tension chord experienced the largest forces, yet did not fail in withdrawal. These results point to the effectiveness of 0.5-in diameter lag screws when selected and installed per the IRC deck ledger connection provisions in Table R502.2.2.1 (ICC 2009b).</u> The results obtained in this study should generally apply to decks with an aspect ratio of 1:1 and less, where aspect ratio is defined as the deck dimension perpendicular to the house divided by the dimension parallel to the house. The study results should not be applied to decks having an aspect ratio greater than 1:1 as the failure modes and deck behavior may substantially change."

7,000 lb. of lateral load placed at the centroid of the deck and the lag screws "did not fail in withdrawal" and the band joist experienced no visible sign of anything.

The summary of all this is simple. Wind and seismic don't produce lateral loads on standard decks with sufficient magnitude to justify a special lateral connection across all zones.
Occupants can only produce about 12 psf of lateral force uniformly across a deck. A 12 x 12 deck attached per the IRC ledger-fastening table and WITHOUT lateral anchors was able to resist a resultant lateral force of 7,000 lb. The joists split and failed while there was only a fraction of an inch of movement in the ledger and no visible sign of any change to the rim joist. The equivalent load

that could be produced by occupants is 1728 lb. 1/4th of a 7,000 lb test that still did not separate the ledger or band joist from the home.

Based on 12 psf of lateral load design, it would take 583 square feet to generate 7,000 lb. With the longest common framing material available being 18 ft. long, a 583 sf deck would be 18 ft. x 32 ft. This reduces the aspect ratio from 1:1 for the 12 x 12 deck to 1:1.77. This reduction in aspect ratio reduces the resultant force at the ledger ends. It also increases the length of the lag-screwed ledger from 12 ft. to 32 ft, meaning more fasteners to resist the additional load. With this consideration and extrapolating the test results, a deck constructed of common dimensional lumber can be built of any size without exceeding the values found in these tests, provided the deck aspect ratio is no greater than 1:1.

Occupants' movement will not disconnect a ledger attached per the IRC fastening table. Lateral devices are just not even close to necessary.

In summary, the request of the committee from the 2009 code development to have further testing of the band joist connection has been satisfied. The real data from research clearly disproves the necessity of the lateral load anchor details "permitted" in the IRC

The current lateral load provisions first came to the code as late as possible, as a public comment. It's no wonder they are now found to be flawed. With an approval as modified of this public comment, lateral load provisions can be developed as they should be. With a clean start and a lot learned, provisions can be based on real research, vetted by professionals nationwide, and introduced at the beginning of the code development process.

ADDITIONAL INFORMATION

How did Figure R507.2.3 get in the IRC?

During the development of the 2009 IRC, (supplement cycle), a new proposal was submitted at the start of the modification process. This proposal provided a much needed ledger connection table for the fastening of a deck ledger to a band joist. Extensive testing conducted by Dr. Frank Woste and peers conducted at Virginia Tech was the basis of this critical addition to the IRC.

During the committee hearings, the committee approved the ledger connection table. They did provide a comment, however, stating that this provided a great connection between the ledger and the band joist, but they would like to see more research regarding the connection of the band joist to the remaining framing.

To address this committee comment regarding the sufficiency of the band joist connection to the structure, the lateral load detail and provisions were submitted as a modification to the ledger connection table. During the final hearings, the voting membership in attendance approved the modification. Without being fully vetted through the entire code modification process, the lateral load provisions were printed in the 2009 IRC. They were approved for the IRC after only being alive in the process for 46 days. This created the following implications:

1) A prescriptive structural provision was included in the code without any scientific or statistic basis what-so-ever. The 1500 lb value is a mere guess.
2) It requires fastening of floor sheathing greater than that required by perscriptive code for floor construction.
3) It is described as a connection that "shall be permitted". This phrase is used as a clarifier in the IRC for when an installation would be otherwise prohibited. This language created confusion in code administration leading to it being considered a "requirement".
4) A proprietary based fastening solution, complete with artwork, as the sole remedy.

The origin for the lateral load detail in the IRC is from a FEMA document for earthquake resistant design. Though not tied to any siesmic zone, the IRC detail is MORE RESTRICTIVE than the FEMA detail in that it requires additional fastening of the floor sheathing to the joist with the hold down.

How have the IRC lateral load provisions affected the construction industry.

The domino effect of including an unfounded structural value for an unothodox "permissable" connection utilizing proprietary products in the IRC has been dramatic. To the decking industry, it has un-necesarrily driven up the cost of construction. Most alarming is that the added expense and inconvenience without foundation has served as motivation to homeowners to have their deck built without permit. Installation of the hold-down detail requires invasive remodeling that most homeowners will not accept.

Another impact is the code insutry itself, where it has devalued the legitimacy of the IRC provisions with unfounded structural designs and supports a demand for proprietary products. As a code administrator, I am appauled, as are many of my colleagues. Many of the following graphics are intended to show how the lateral load provisions have caused unwarranted delimna.

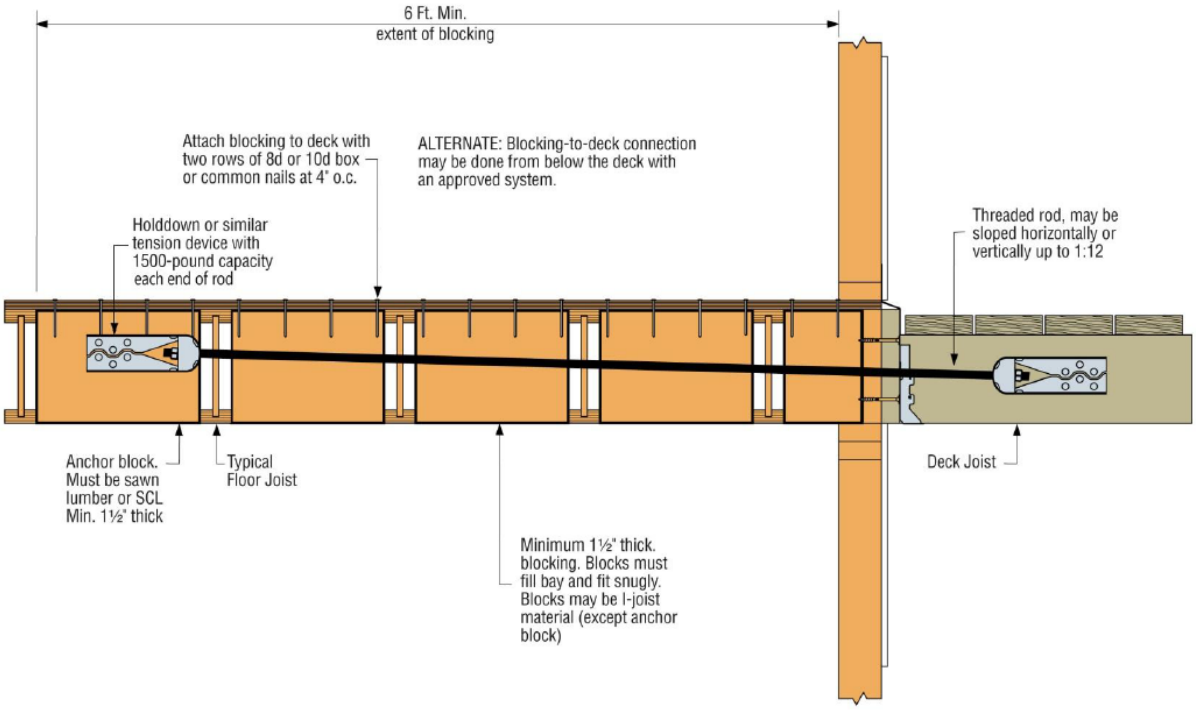
Wood I-joist Manufacturers Association.

I-joist manufacturers, fielding inquiries regarding how to connect a 1500 lb load device to their floor systems, had to respond. The Wood I-joist Manufacturers Assocation did just that with the publication of a technical report. With no choice but to use the 1500 lb figure published in the IRC, they were forced to create details such as those below.

Take a moment and look at the details and some of the potential ramifications.

- Removal of floor finish
- Removal of ceiling finish
- Threaded rod extending at least 6 feet into the floor system with blocking in every bay.
- Floor sheathing that must be fastened to he blocking at 4 inches on center.

This is to satisfy an IRC load that is not proven and not even required.



As mentioned previously, the lateral load detail and provisions is unusually included in the code as a “permitted” method to resist lateral loads…that are undefined and undetermined. Being unorthodox language for the IRC, it is promoted as if it is required by many organizations, manufacturers and professionals. The text shown below is copied from the WIJMA details and appears to promote a “requirement” for this connection that is merely “permitted”.

Deck Lateral Load Connection to Prefabricated Wood I-Joist Floor System

The International Residential Code (IRC) includes provisions for resisting lateral forces of an exterior deck that is attached to a structure. Specifically, 2009 IRC R502.2.2.3 and 2012 IRC R507.2.3 require connections at two locations that resist a minimum lateral load of 1500 lbs per connection.

ICC-ES Acceptance Criteria Development
In December of 2010 ICC Evaluation Services began development of an acceptance criteria, AC430, for “Deck harness devices”. The purpose of these criteria was to test alternative methods of lateral load connection other than the hold-down/threaded rod method provided in the 2009 IRC. Interestingly, here is a statement by ICC-ES staff regarding this subject.

TO: **PARTIES INTERESTED IN DECK HARNESS DEVICES AND ASSEMBLIES FOR RESIDENTIAL DECKS**

SUBJECT: Proposed Acceptance Criteria for Deck Harness Devices and Assemblies for Residential Decks, Subject AC430-0211-R1 (MO/JS)

> The ICC-ES staff is of the opinion that the devices specified in IRC Section R502.2.2.3 are prescriptive requirements, in lieu of engineered connections to the primary structure. Regardless of whether the hold-down tension devices specified in IRC Section R502.2.2.3 are to be considered components within the primary structural support system, or as safety devices within a backup system, the devices clearly serve a structural purpose, as indicated by the minimum required ASD capacity of 1500 pounds (6672 N).

Though the lateral load detail was approved for the 2009 IRC as merely a "permitted detail" and not outright required, it became the easy answer. Note that the justification for this connection, according to ICC-ES, is that "…the devices clearly serve a structural purpose, as indicated by the minimum required ASD capacity of 1500 pounds." At this point, the reason why the lateral load provisions were originally included in the IRC are starting to be lost. ICC-ES doesn't know if it is part of the primary design or a backup safety device. The answer is that it is out of concern of the band joist (rim joist) detaching from the structure.

RB263-13

Final Action: AS AM AMPC____ D

RB264-13

R507.1, R507.4 (NEW), R507.5 (NEW), Figure R507.5 (NEW), Table R507.5 (NEW), R507.5.1, R507.6, Figure R507.6 (NEW), Table R507.6 (NEW), R507.7 (NEW), R507.8 (NEW), R507.8.1 (NEW), Figure R507.8.1 (NEW), R507.8.2 (NEW), Figure R507.8.2 (NEW)

Proposed Change as Submitted

Proponent: Brian Foley, P.E. Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov), Glenn Mathewson, M.C.P., North American Deck and Railing Association, Randy Shackleford, P.E., Simpson Strong-Tie

Revise as follows:

R507.1 Decks. Wood decks shall be in accordance with this section. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.

R507.4 Decking. Wood decking shall be at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.

Exceptions:

1. Wood decking with a minimum nominal thickness of 1 $^1/_4$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.
2. Wood/plastic composite decking in accordance with Section R507.3.

R507.5 Allowable deck joist spans. Spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joist shall be permitted to cantilever a maximum of one-fourth of the joist span.

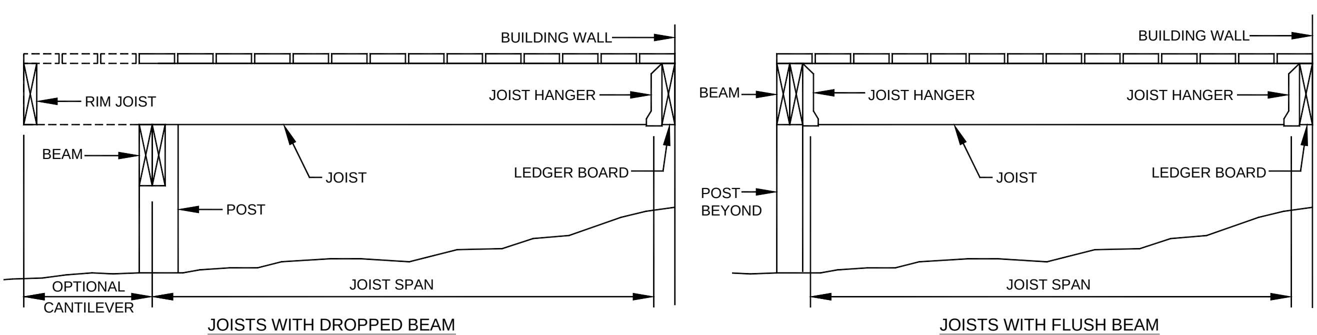


FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b] (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	10-4	9-5	7-10	7-1	7-1	7-1
	2 x 8	13-8	12–5	10–2	10-9	10-9	10-2
	2 x 10	17-5	15–10	13–1	15-6	15-6	13-1
	2 x 12	18-0	18–0	15-5	18-0	18-0	15-5
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. No. 2 grade with wet service factor.
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor

R507.5.1 Lateral restraint at supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3)10d threaded nails or (3)#10x3 inch (76 mm) long wood screws.

R507.6 Deck Beams. Spans for deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d threaded nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the beam span. Splices of multi-span beams shall be located at interior post locations.

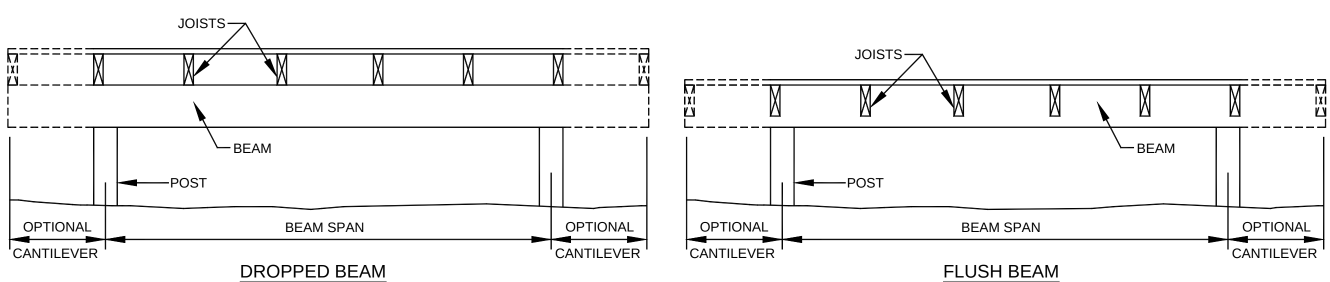


FIGURE R507.6
TYPICAL DECK BEAM SPANS

TABLE R507.6
DECK BEAM SPAN LENGTHS (ft.-in.)[a, b]

SPECIES[c]	SIZE[d]	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	7-1	6-2	5-6	5-0	4-8	4-4	4-1
	2-2x8	9-2	7-11	7-1	6-6	6-0	5-7	5-3
	2-2x10	11-10	10-3	9-2	8-5	7-9	7-3	6-10
	2-2x12	13-11	12-0	10-9	9-10	9-1	8-6	8-0
	3-2x6	8-7	7-8	6-11	6-3	5-10	5-5	5-2
	3-2x8	11-4	9-11	8-11	8-1	7-6	7-0	6-7
	3-2x10	14-5	12-10	11-6	10-6	9-9	9-1	8-7
	3-2x12	17-5	15-1	13-6	12-4	11-5	10-8	10-1
Douglas fir-larch[e],	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9

hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

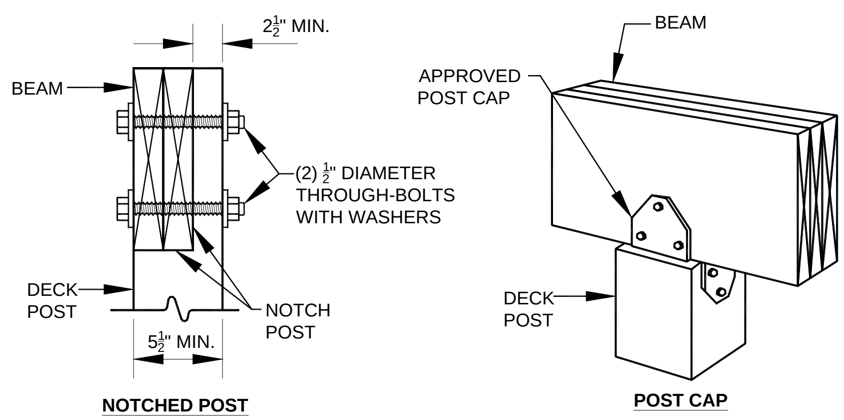
a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
b. Beams supporting deck joists from one side only.
c. No 2 grade, wet service factor.
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
e. Includes incising factor.
f. Northern species with no incising factor.

R507.7 Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Beam bearing at deck posts shall be in accordance with Section R507.8.1.

R507.8 Deck posts. For single level wood decks with beams sized in accordance with Table R507.6, posts shall be a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm) measured to the underside of the beam.

Exception: Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).

R507.8.1 Deck post to deck beam. Deck beams shall be attached to deck posts in accordance with Figure R507.8.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

FIGURE R507.8.1
DECK BEAM TO DECK POST

R507.8.2 Deck post to deck footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2.

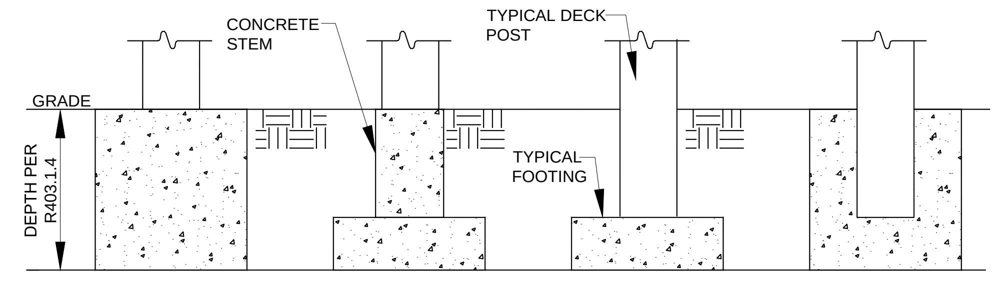


FIGURE R507.8.2
TYPICAL DECK POSTS TO DECK FOOTINGS

Reason: Wood decks are the most prolific structure to be constructed to a residential dwelling, yet there is very little guidance in the IRC regarding the structural capacity of the joists, beams and posts. The existing span tables in Chapter 5 do not address wood decks due to the differences in their design considerations. Some builders and code officials often rely on span tables developed by AHJs or the DCA6 published by the American Wood Council, while others have nothing to refer to.

With the permission of the American Wood Council, we have provided in this proposal their span tables for typical joists and beams and height requirements for typical posts based on the most common wood species and grade used throughout the country. Attachment and bearing requirements are also provided to give the user guidance on how these elements connect. With the existing provisions already in Section 507, the IRC user would be able to design and construct a safe wood deck.

Careful attention was given to ensure these new provisions did not and could not deter the construction of decks composed of other materials and in different configurations and conditions.

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

R507.1-RB-FOLEY.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this proposal needs reworking and brought back. There is no criteria for the threaded nails. Language is unclear. There is no provision for the deck post to footing to be raised above grade for moisture protection.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brian Foley, Fairfax County, VA, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.1 Decks. Wood-framed decks shall be in accordance with this section or Section R301 for materials and conditions not prescribed herein. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. ~~The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.~~

~~**R507.4 Decking.** Wood decking shall be at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.~~

~~**Exceptions:**~~

~~3. Wood decking with a minimum nominal thickness of $^5/_4$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.~~

~~4. Wood/plastic composite decking in accordance with Section R507.3.~~

R507.~~5~~4 Allowable deck joist spans. Spans for wood deck joists, as shown in Figure R507.~~5~~4, shall be in accordance with Table R507.~~5~~4. Deck joists shall be permitted to cantilever a maximum of one-fourth of the actual joist span.

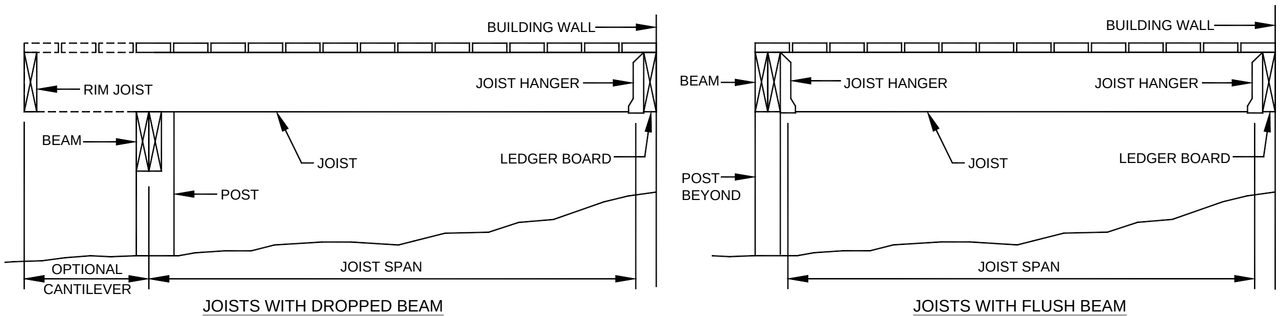


FIGURE R507.~~5~~4
TYPICAL DECK JOIST SPANS

TABLE R507.~~5~~4
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b,f] (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	~~10-4~~ 9-11	~~9-5~~ 9-0	~~7-10~~ 7-7	~~7-1~~ 6-8	~~7-1~~ 6-8	~~7-1~~ 6-8
	2 x 8	~~13-8~~ 13-1	~~12–5~~ 11-10	~~10–2~~ 9-8	~~10-9~~ 10-1	~~10-9~~ 10-1	~~10-2~~ 9-8
	2 x 10	~~17-5~~ 16-2	~~15–10~~ 14-0	~~13–1~~ 11-5	~~15-6~~ 14-6	~~15-6~~ 14-0	~~13-1~~ 11-5
	2 x 12	18-0	~~18–0~~ 16-6	~~15-5~~ 13-6	18-0	~~18-0~~ 16-6	~~15-5~~ 13-6
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

f. No. 2 grade with wet service factor.

g. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.

h. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.

i. Includes incising factor.

j. Northern species with no incising factor

k. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

~~**R507.5.1 Lateral restraint at supports.** Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3) 10d (3" x 0.128") threaded nails or (3) #10x3 inch (76 mm) long wood screws.~~

R507.~~6~~5 Deck Beams. Spans for deck beams, as shown in Figure R507.~~6~~5, shall be in accordance with Table R507.~~6~~5. Beam plies shall be fastened in accordance with Table R602.3(1). ~~with two rows of 10d (3" 0.128") threaded nails minimum at 16 inches (406 mm) on center along each edge.~~ Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. ~~Splices of multi-span beams shall be located at interior post locations.~~

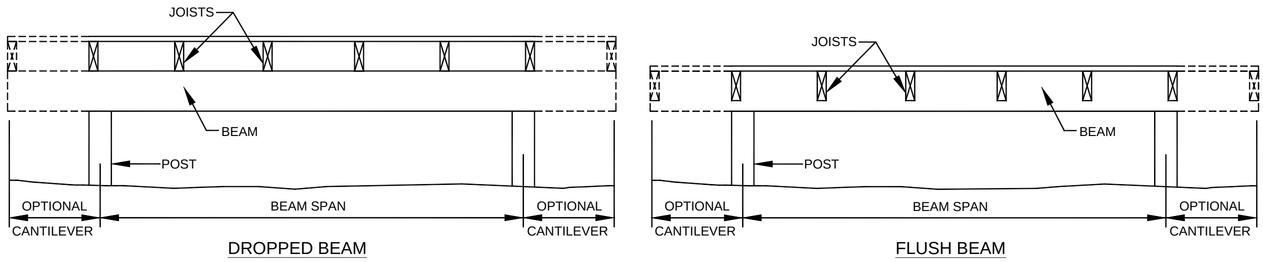


FIGURE R507.65
TYPICAL DECK BEAM SPANS

TABLE R507.65
DECK BEAM SPAN LENGTHS (ft.-in.)[a, b]

SPECIES[c]	SIZE[d]	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	~~7-1~~ 6-11	~~6-2~~ 5-11	~~5-6~~ 5-4	~~5-0~~ 4-10	~~4-8~~ 4-6	~~4-4~~ 4-3	~~4-1~~ 4-0
	2-2x8	~~9-2~~ 8-9	~~7-11~~ 7-7	~~7-1~~ 6-9	~~6-6~~ 6-2	~~6-0~~ 5-9	~~5-7~~ 5-4	~~5-3~~ 5-0
	2-2x10	~~11-10~~ 10-4	~~10-3~~ 9-0	~~9-2~~ 8-0	~~8-5~~ 7-4	~~7-9~~ 6-9	~~7-3~~ 6-4	~~6-10~~ 6-0
	2-2x12	~~13-11~~ 12-2	~~12-0~~ 10-7	~~10-9~~ 9-5	~~9-10~~ 8-7	~~9-1~~ 8-0	~~8-6~~ 7-6	~~8-0~~ 7-0
	3-2x6	~~8-7~~ 8-2	~~7-8~~ 7-5	~~6-11~~ 6-8	~~6-3~~ 6-1	~~5-10~~ 5-8	~~5-5~~ 5-3	~~5-2~~ 5-0
	3-2x8	~~11-4~~ 10-10	~~9-11~~ 9-6	~~8-11~~ 8-6	~~8-1~~ 7-9	~~7-6~~ 7-2	~~7-0~~ 6-8	~~6-7~~ 6-4
	3-2x10	~~14-5~~ 13-0	~~12-10~~ 11-3	~~11-6~~ 10-0	~~10-6~~ 9-2	~~9-9~~ 8-6	~~9-1~~ 7-11	~~8-7~~ 7-6
	3-2x12	~~17-5~~ 15-3	~~15-1~~ 13-3	~~13-6~~ 11-10	~~12-4~~ 10-9	~~11-5~~ 10-0	~~10-8~~ 9-4	~~10-1~~ 8-10
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

g. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
h. Beams supporting deck joists from one side only.
i. No 2 grade, wet service factor.
j. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
k. Includes incising factor.
l. Northern species with no incising factor.

~~**R507.7 Deck joist and deck beam bearing.** The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Beam bearing at deck posts shall be in accordance with Section R507.8.1.~~

R507.86 Deck posts. For single level wood-framed decks with beams sized in accordance with Table R507.65, posts shall be in accordance with Table R507.6. ~~a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm), measured to the underside of the beam.~~

~~**Exception:** Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).~~

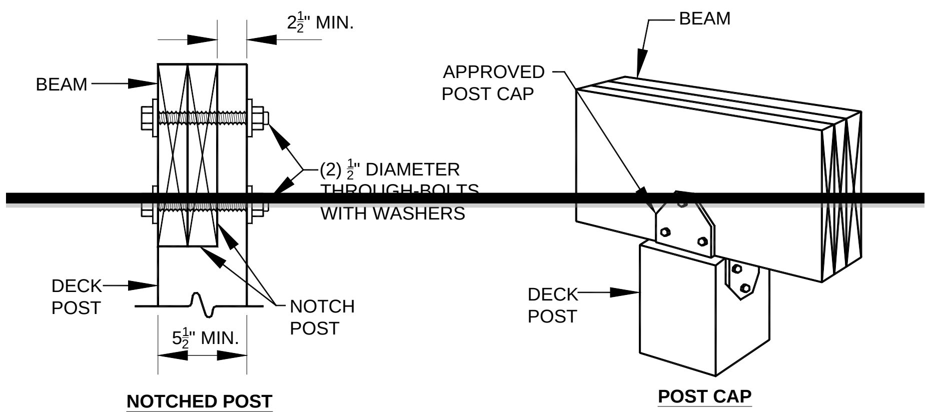
TABLE R507.6

DECK POST HEIGHT

DECK POST SIZE	MAXIMUM HEIGHT [a]
4x4	8'
4x6	8'
6x6	14'

For SI: 1 foot = 304.8 mm.
[a] Measured to the underside of the beam.

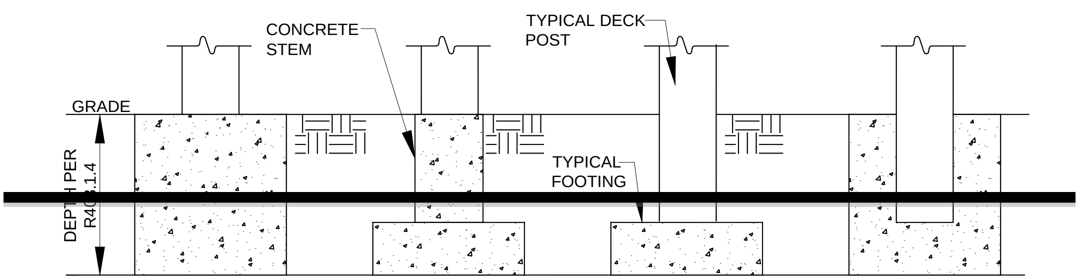
~~**R507.8.1 Deck post to deck beam.** Deck beams shall be attached to deck posts in accordance with Figure R507.8.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.~~



For SI: 1 inch = 25.4 mm

~~**FIGURE R507.8.1**~~
~~**DECK BEAM TO DECK POST**~~

~~**R507.8.2 Deck post to deck footing.** Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2.~~



~~**FIGURE R507.8.2**~~
~~**TYPICAL DECK POSTS TO DECK FOOTINGS**~~

Commenter's Reason: There are no provisions for building a wood-framed, exterior deck under the prescriptive provisions of the existing IRC. Decks have notoriously never been address comprehensively in any building standard in our country, and therefore there are a great variety of construction methods that have long been in practice. An informal and open group of professionals and organizations have been working together to recognize this variety and develop well-rounded provisions suitable for the IRC. The provisions proposed in the original RB264-13 represented what could generally be agreed upon by the majority, however, testimony during the hearings on this and other deck-related proposals drew doubt from the committee that industry-wide agreement had been met.

This group continues to work together and will likely do so toward 2018 IRC proposals. Until then, the nation is left without clear guidance for joist and beams spans intended specifically for conventionally framed decks in wet-use environments. The joist span tables currently in the IRC are not suitable for exterior, treated or incised lumber and there is no method for sizing beams appropriately. RB264-13, in this public comment, has been edited to include joist, beam and post sizing only such that the most basic of deck structural elements can be recognized in the code. Tens of thousands of decks will be built every year and permitted by building officials. With this proposed change, the IRC will address them better.

Public Comment 2:

Glenn Mathewson, Westminster, CO, representing North American Deck and Railing Association (NADRA) requests Approval as Modified by this Public Comment.

Modify the proposal as follows

R507.1 Decks. Wood-framed decks shall be in accordance with this section or Section R301 for materials and conditions not prescribed herein. . Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. ~~The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.~~

R507.4 Decking. Maximum allowable spacing for joists supporting ~~wood~~ decking shall be in accordance with Table R507.4. ~~at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center.~~ Wood decking shall be attached to each supporting member with a minimum of (2)8d nails or (2)#8 wood screws.

~~**Exceptions:**~~

~~5. Wood decking with a minimum nominal thickness of $^5/_4$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.~~

~~6. Wood/plastic composite decking in accordance with Section R507.3.~~

Table R507.4
Maximum joist spacing

Material type and nominal size	Maximum on-center joist spacing	
	Perpendicular to joist	Diagonal to joist[a]
5/4-inch thick wood	16 inches	12 inches
2-inch thick wood	24 inches	16 inches
Plastic composite	Per R507.3	Per R507.3

For SI: 1 inch = 25.4 mm
a. Maximum angle of 45 degrees from perpendicular for wood deck boards

R507.5 ~~Allowable~~ Deck joists ~~spans~~. Maximum allowable spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joist shall be permitted to cantilever a maximum of one-fourth of the actual, adjacent joist span.

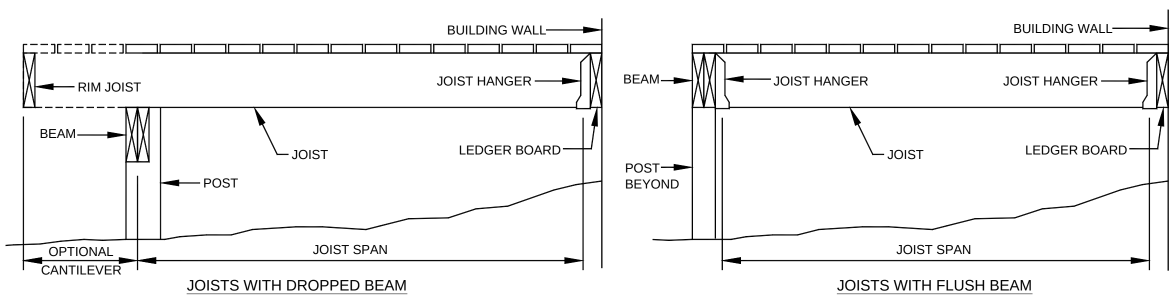


FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES[a]	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER[b, f] (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS[c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	~~10-4~~ 9-11	~~9-5~~ 9-0	~~7-10~~ 7-7	~~7-1~~ 6-8	~~7-1~~ 6-8	~~7-1~~ 6-8
	2 x 8	~~13-8~~ 13-1	~~12–5~~ 11-10	~~10–2~~ 9-8	~~10-9~~ 10-1	~~10-9~~ 10-1	~~10-2~~ 9-8
	2 x 10	~~17-5~~ 16-2	~~15–10~~ 14-0	~~13–1~~ 11-5	~~15-6~~ 14-6	~~15-6~~ 14-0	~~13-1~~ 11-5
	2 x 12	18-0	~~18–0~~ 16-6	~~15-5~~ 13-6	18-0	~~18-0~~ 16-6	~~15-5~~ 13-6
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars,	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6

ponderosa pine[e], red pine[e]	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

l. No. 2 grade with wet service factor.
m. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.
n. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
o. Includes incising factor.
p. Northern species with no incising factor
q. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

R507.5.1 Lateral restraint at supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3) 10d (3" x 0.128") ~~threaded~~ nails or (3) #10x3 inch (76 mm) long wood screws.

R507.6 Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d (3" 0.128") ~~threaded~~ nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multi-span beams shall be located at interior post locations.

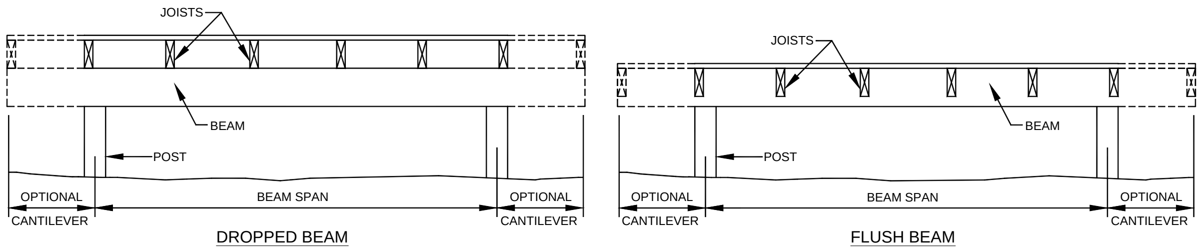


FIGURE R507.6
TYPICAL DECK BEAM SPANS

TABLE R507.6
DECK BEAM SPAN LENGTHS (ft.-in.)[a, b]

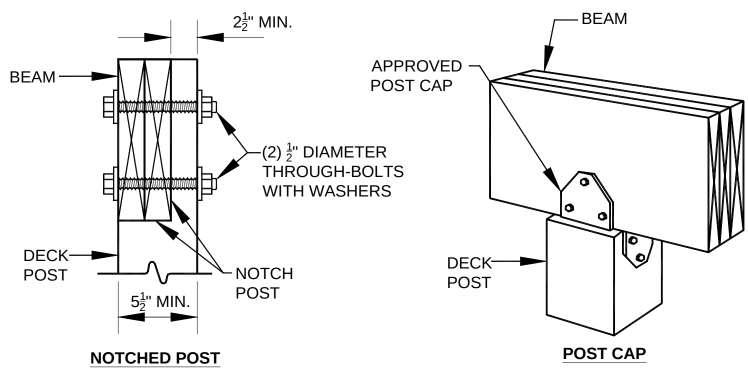
SPECIES[c]	SIZE[d]	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	~~7-1~~ 6-11	~~6-2~~ 5-11	~~5-6~~ 5-4	~~5-0~~ 4-10	~~4-8~~ 4-6	~~4-4~~ 4-3	~~4-1~~ 4-0
	2-2x8	~~9-2~~ 8-9	~~7-11~~ 7-7	~~7-1~~ 6-9	~~6-6~~ 6-2	~~6-0~~ 5-9	~~5-7~~ 5-4	~~5-3~~ 5-0
	2-2x10	~~11-10~~ 10-4	~~10-3~~ 9-0	~~9-2~~ 8-0	~~8-5~~ 7-4	~~7-9~~ 6-9	~~7-3~~ 6-4	~~6-10~~ 6-0
	2-2x12	~~13-11~~ 12-2	~~12-0~~ 10-7	~~10-9~~ 9-5	~~9-10~~ 8-7	~~9-1~~ 8-0	~~8-6~~ 7-6	~~8-0~~ 7-0
	3-2x6	~~8-7~~ 8-2	~~7-8~~ 7-5	~~6-11~~ 6-8	~~6-3~~ 6-1	~~5-10~~ 5-8	~~5-5~~ 5-3	~~5-2~~ 5-0
	3-2x8	~~11-4~~ 10-10	~~9-11~~ 9-6	~~8-11~~ 8-6	~~8-1~~ 7-9	~~7-6~~ 7-2	~~7-0~~ 6-8	~~6-7~~ 6-4
	3-2x10	~~14-5~~ 13-0	~~12-10~~ 11-3	~~11-6~~ 10-0	~~10-6~~ 9-2	~~9-9~~ 8-6	~~9-1~~ 7-11	~~8-7~~ 7-6
	3-2x12	~~17-5~~ 15-3	~~15-1~~ 13-3	~~13-6~~ 11-10	~~12-4~~ 10-9	~~11-5~~ 10-0	~~10-8~~ 9-4	~~10-1~~ 8-10
Douglas fir-larch[e], hem-fir[e], spruce-pine-fir[e], redwood, western cedars, ponderosa pine[f], red pine[f]	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
m. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
n. Beams supporting deck joists from one side only.
o. No 2 grade, wet service factor.
p. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
q. Includes incising factor.
r. Northern species with no incising factor.

R507.7 Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Joists bearing on a beam shall be connected to the beam to resist lateral displacement. ~~Beam bearing at deck posts shall be in accordance with Section R507.8.1.~~

R507.~~8~~7.1 Deck post to deck beam. Deck beams shall be attached to deck posts in accordance with Figure R507.8.1 or by other equivalent means capable ~~Post to beam connections shall be constructed~~ to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

Exception: Where deck beams bear directly on footings in accordance with Section R507.8.2



For SI: 1 inch = 25.4 mm

FIGURE R507.8.1
DECK BEAM TO DECK POST

R507.8 Deck posts. For single level wood-framed decks with beams sized in accordance with Table R507.6, deck post size shall be ~~a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm) measured to the underside of the beam.~~ in accordance with Table R507.8.

~~**Exception:** Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).~~

Table R507.8
Deck Post Height

Deck Post Size	Maximum Height
4x4	8’
4x6	8’
6x6	14’

a. Measured to the underside of the beam.

R507.8.2 Deck post to deck footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2. Posts shall be restrained to prevent lateral displacement at the bottom support. Such lateral restraint shall be provided by manufactured connectors installed in accordance with Section R507 and the manufacturers’ installation instructions or a minimum post embedment of 12-inches in surrounding soils or concrete piers.

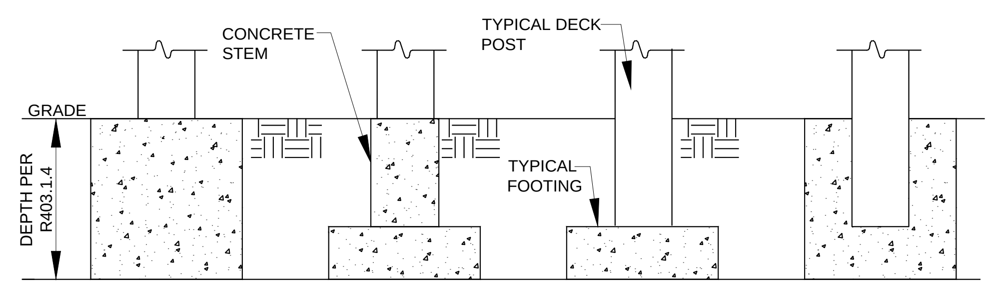


FIGURE R507.8.2
TYPICAL DECK POSTS TO DECK FOOTINGS

R317.1.4 Wood columns. Wood columns shall be approved wood of natural decay resistance or approved pressure-preservative-treated wood.

Exceptions:

1. Columns exposed to the weather or in basements when supported by concrete piers or metal pedestals projecting 1 inch (25.4 m) above a concrete floor or 6 inches above exposed earth and the earth is covered by an approved impervious moisture barrier.
2. Columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building when supported by a concrete pier or metal pedestal at a height more than 8 inches from exposed earth and the earth is covered by an impervious moisture barrier.
3. <u>Deck posts supported by concrete piers or metal pedestals projecting a minimum of 1 inch above a concrete floor or 6 inches above exposed earth.</u>

Commenter's Reason: There is no method in which any typical, wood-framed, exterior deck can be built under the prescriptive provisions of the IRC. Decks have notoriously never been address comprehensively in any building standard in our country, and therefore there are a great variety of construction methods that have long been in practice. An informal and open group of professionals and organizations have been working together to recognize this variety and develop well-rounded provisions suitable for the IRC. It hasn't and won't be easy or quick. The provisions proposed in the original RB264-13 represented what could generally be agreed upon by the majority, however, testimony during the hearings on this and other deck-related proposals drew doubt from the committee that industry-wide agreement had been met.

RB264-13, in this public comment, has been expanded and re-written to recognize further consensus from the discussion group, to better present code provisions, and to address opposition testimony from the committee hearings.

The decking provisions have been rewritten to better describe the angled vs. perpendicular conditions. The new table proposed, R507.4, mirrors the organization and language of another long-standing IRC table for lumber floor sheathing, R503.1.

The post-sizing provisions have also been presented in table form for better presentation of the information.
Concerns regarding Figure R507.8.2 and the lack of a projection of the foundations above grade level were brought up during the hearing and were recognized in this public comment. It was agreed by the proponents of this comment that foundation details are not the appropriate location for provisions regarding the decay resistance of wood members. To better clarify the relationship between the height of footing and the decay resistance of the posts, a third exception specifically addressing decks was added to the current provisions for post (column) decay resistance, R317.1.4, "Wood columns"

Span tables were updated to the new design values for southern pine, and other minor clarifications were made throughout the proposal.

RB264-13

Final Action: AS AM AMPC____ D

RB265-13

R507.2, Table 507.2, R507.2.1, R507.2.2, R507.2.3 (NEW)

Proposed Change as Submitted

Proponent: Glenn Mathewson, North American Deck and Railing Association, representing The Colorado Chapter of the International Code Council, (GlennMathewson@nadra.org)

Revise as follows:

R507.2 Deck leger connection to band joist. ~~For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir, or *approved* decay-resistant species, and a 2-inch (51mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with ½-inch (12.7 mm) lag screws or bolts with washers in accordance with Table R507.2. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel.~~ Deck ledger connections to band joists shall be in accordance with this section and Table R507.2, Table R507.2.1, Figure R507.2.1(1) and Figure R507.2.1(2). For other grades, species, connection details, and loading conditions, decks shall be designed in accordance with section R301.

~~**R507.2.1 Placement of lag screws or bolts in deck ledgers and band joists.** The lag screws or bolts in deck ledgers and band joists shall be placed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1 (2).~~

R507.2.1 Ledger details. Deck ledgers installed in accordance with section R507.2 shall be a minimum 2 x 8 nominal, pressure-preservative-treated or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

~~**R507.2.2 Alternate deck ledger connections.** Deck ledger connections not conforming to Table R507.2 shall be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.~~

R507.2.2 Band joist details. Band joists attached by a ledger in accordance with section R507.2 shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1 x 9.5 dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with section R507.2 shall be fully supported by a wall or sill plate below.

R707.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figure R507.2.1(1) and Figure R507.2.1(2).

TABLE R507.2
~~FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND A 2-INCH-NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST~~[~~c, f, g~~]
DECK LEDGER CONNECTION TO BAND JOIST[c, d, e]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load <= 40 psf)

	JOIST SPAN						
~~JOIST SPAN~~	6' and less	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
Connection details	On-center spacing of fasteners[~~d, e~~]						

½ inch diameter lag screw with $^{15}/_{32}$ inch maximum sheathing[a]	30	23	18	15	13	11	10
½ inch diameter bolt with $^{15}/_{32}$ inch maximum sheathing	36	36	34	29	24	21	19
½ inch diameter bolt with ~~$^{15}/_{32}$~~ 1 inch maximum sheathing ~~and ½ inch washers~~[~~b, h~~ b]	36	36	29	24	21	18	16

For SI: 1 inch =n 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.

a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

~~b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inch.~~

b. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable sheathing thickness.

c. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.

~~d. Lag screws and bolts shall be staggered in accordance with Section R507.2.1~~

~~e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.~~

~~f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.~~

~~g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist~~

~~h~~ d. Wood structural panel ~~sheathing~~, gypsum board ~~sheathing~~, fiberboard, lumber, or foam sheathing ~~not exceeding 1 inch in thickness~~ shall be permitted. ~~The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.~~

e. Snow load shall not be assumed to act concurrently with live load.

Reason: The prescriptive ledger bolting provisions are very specific, yet difficult to understand and somewhat contradictory between the language in Section R507.2 and that of Table R507.2. Overall, this code modification proposal does not intend to change the application of the current provisions.

--Footnote "h" is the only place where the description of the type of sheathing permitted is provided. However, footnote "h" is only referenced in one of the three connection methods in the table. This has been corrected to reflect that the various sheathing types are allowed under all methods by placing the footnote reference in the main title of the table.

--Fiberboard ("black celotex®" or "thermoply® for example) and lumber sheathing (diagonal wood sheathing) is likely to be encountered in deck construction on existing homes. The current provision provides a blanket approval of "foam sheathing" which includes varying compositions and performance levels without regard. Under that consideration, fiberboard and lumber should certainly be acceptable up to the same maximum thickness.

--Footnote "b" and "h" are discussing the same topic but with different points of references. This is confusing, and has been corrected.

--Why list various engineered wood products in footnote f and reference what we already know about engineered alternatives. This is unnecessary text. They are alternatives and need to be approved under R104.11 or R301.

--In the current language, the description of allowable species for ledger material is not consistent between the section language, table title and table footnotes. The Section refers to decay resistant properties of PPT pine or hem-fir, and then continues with an ambiguous reference to "approved decay-resistant species" leaving it to the building official to decide. The Table heading, however, refers only to the pine and hem-fir and not the use of decay-resistant species. It is further confused with the references in the table footnotes for use of any PPT, No 2 grade lumber species or engineering. There is no consistency and it is not user friendly. The proposed language makes use of the IRC-defined term "naturally durable lumber" as opposed to "decay-resistant" and clearly explains the materials allowed under this connection method in the body of the code as opposed to footnotes in a table.

--"Rim Board" is a registered trademark of APA. The use of the term "rimboard" in discussions unique to engineered wood products used as band joists infers that said engineered band joist must be one rated by APA. The IRC does not require engineered lumber band joists to be APA rated "Rim Board". It is simply too similar to a proprietary trademark to be appropriate terminology for the IRC, when the industry- and IRC-wide term "band joist" is available for use.

--The description of the allowable materials for the home's band joist are described in the Section, the Table title and then again in the footnotes. As with the ledger material, this is now described only in the body of the code section.

--The current language would prohibit the connection of a deck ledger to a band joist that was larger in it's narrow cross-section than 2-inches, thus the term "minimum" has been moved in front of this size description.

Prohibition to supporting beams/girders on ledgers and band joist after the sentence about "engineering practice" and under the heading of "alternate deck ledger connections" is misleading. A design professional should not be prohibited from making such design. The intent has been presented more clearly in this proposal, that simply the fastening schedule does not anticipate concentrated loads from beams.

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

R507.2-RB-MATHEWSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent's reason is very confusing. The deck provisions are evolving and once these changes are proven the proposal should be reworked and brought back.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Glenn Mathewson, MCP, City of Westminster, CO, representing North American Deck and Railing Association and the Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R507.2 Deck leger connection to band joist. Deck ledger connections to band joists shall be in accordance with this section and Table R507.2, Table R507.2.1, Figure R507.2.1(1) and Figure R507.2.1(2). For other grades, species, connection details, and loading conditions, ~~decks~~ ledger connections shall be designed in accordance with section R301.

R507.2.1 Ledger details. Deck ledgers installed in accordance with section R507.2 shall be a minimum 2 x 8 nominal, pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.2.2 Band joist details. Band joists attached by a ledger in accordance with section R507.2 shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1 x 9.5 dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with section R507.2 shall be fully supported by a wall or sill plate below.

R507.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figure R507.2.1(1) and Figure R507.2.1(2).

TABLE R507.2
DECK LEDGER CONNECTION TO BAND JOIST[c, d, e]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load <= 40 psf)

	Joist span						
	6' and less	**6'1" to 8'**	**8'1" to 10'**	**10'1" to 12'**	**12'1" to 14'**	**14'1" to 16'**	**16'1" to 18'**
Connection details	**On-center spacing of fasteners**						
1/2 inch diameter lag screw with ~~15/32~~ 1/2 inch maximum sheathing[a]	30	23	18	15	13	11	10
1/2 inch diameter bolt with ~~15/32~~ 1/2 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 1 inch maximum sheathing [b]	36	36	29	24	21	18	16

For SI: 1 inch =n 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.

a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
b. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable wood structural panel or lumber sheathing thickness.
c. Ledgers shall be flashed in accordance with section R703.8.
d. Wood structural panel, gypsum board, fiberboard, lumber, or foam sheathing shall be permitted.
e. Snow load shall not be assumed to act concurrently with live load.

Commenter's Reason: During the hearings, the committee expressed concern that the species Southern Pine had been removed from the code language. Though the original proposal did not preclude this species from use, it has been retained from the current 2012 language in this public comment, along with Hem-Fir.

Floor modifications were presented by both the original proponent and opposition in regard to sheathing types, and may have complicated the proposal. Both of the complications that arose during the committee hearing are explained below.

1) Tightening washers over foam sheathing is not sensible and was not tested.

In the original ledger testing that lead to these provisions in the 2009 IRC, only 15/32-inch thick wood structural panels were tested with a stack of ½ inch washers. The current language in the 2012 IRC allows washers over foam sheathing. Retaining this allowance in the proposed modification drew opposition. With that consideration, and some empirical experience, this public comment modification provides limitations to what sheathing may be used with washers. Stacked washers should only be used with wood structural panel or lumber sheathing. The photo below shows how easily a washer can be pressed into foam sheathing with my hand, a result that would be expected from tightening washers over foam and loading the deck.

2) The fastening schedule for the first two rows (lag screws or bolts with 1/2 inch sheathing) currently provides no guidance for what sheathing is allowed.

Opposition to the original proposal did not believe that ledgers should be placed over any 1/2-inch sheathing other than wood structural panels. This was not based on evidence of failure for such conditions, rather that such condition has not been specifically laboratory tested. This is indeed true; the only known laboratory tests on such connection are with wood structural panel. However……shall we throw away decades of real world experience simply from the absence of a specific laboratory facsimile? Decks have been constructed for generations being attached over siding, stucco, brick veneers and whatever else could not be bothered for removal at the time. They used nails in the ledgers, lacked hangers, were attached to cantilevered floors and were often without any flashing. None of this was good, but decks got little attention…until recently. Now we are finding the worst of the worst construction collapsing under load, those old, forgotten decks that have never been maintained beyond a "sand and stain". Rightfully so, the sins of the past are haunting the deck industry. However, we must look at why these decks are failing. I have. It's not properly flashed and lag screwed decks attached to fully supported band joists that are failing…even when attached over siding as they have been (incorrectly) for years. There is no need to take the decking industry from a free-for-all to overbearing regulation. We must find some balance between both; neither one more important than the other. The balance this public comment is asking for is simple. Will a properly flashed ledger attached to a fully supported band joist with lag screws structurally fail because of 1/2 inch of foam in between? We don't see evidence or history to support that it will. As a plan's analyst, I don't want to have to ask what sheathing is hiding behind my customers' homes as I try to verify their proposed lag screw connection and get their permit issued. For this reason, I am maintaining the allowance of any sheathing to be used in any of the connection methods…likely how code administrators are already interpreting it.

Further modifications have also been prompted since the committee action hearings.

The sheathing thickness of 15/32 inch has been changed to ½ inch to accommodate the thickness of common foam sheathing. This is only a 1/32-inch (6.5%) increase in allowable thickness.

Under section R507.2 the reference to "deck" design has been changed to "deck ledger connections". The subject of this section is the ledger connection, not the entire deck.

It is the intention of this commenter to collect and conduct further research on this matter and make it available at www.decktesting.com.

Public Comment 2:

Randall Shackelford, P.E., Simpson Strong-Tie Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R507.2
DECK LEDGER CONNECTION TO BAND JOIST [~~c, d, e~~ a, b]
(Deck live load = 40 psf, deck dead load = 10 psf, snow load <= 40 psf)

	JOIST SPAN						
	6' and less	**6'1" to 8'**	**8'1" to 10'**	**10'1" to 12'**	**12'1" to 14'**	**14'1" to 16'**	**16'1" to 18'**
Connection details	**On-center spacing of fasteners**						
½ in diameter lag screw with 15/32 inch maximum sheathing[~~a~~ c , d]	30	23	18	15	13	11	10
½ inch diameter bolt with 15/32 inch maximum sheathing[d]	36	36	34	29	24	21	19
½ inch diameter bolt with 1 inch maximum sheathing[~~b~~ e]	36	36	29	24	21	18	16

a. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.

b. Snow load shall not be assumed to act concurrently with live load.

~~a~~ c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

d. Sheathing shall be wood structural panel or solid sawn lumber.

~~b~~ e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber, or foam sheathing. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½-inch of allowable sheathing thickness when combined with wood structural panel or lumber sheathing.

~~c. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.~~

~~d. Wood structural panel, gypsum board, fiberboard, lumber, or foam sheathing shall be permitted.~~

~~e. Snow load shall not be assumed to act concurrently with live load.~~

Commenter's Reason: We think Mr. Matthewson and NADRA did a good job of re-organizing the requirements for deck ledger to band joist connection. The deck ledger to band joist connection is the most important connection on a deck and deserves the attention to make sure it is done in a safe manner. With one notable exception, we agree that the proposal simply improves the section without making technical changes. The one area where it appears that a technical change was made is the application of the proposed footnote d, which would allow any type of sheathing between the band joist and the deck ledger. Placement of footnote d at the title of the table applies that note to all three situations.

We went back and reviewed the testing that was performed to develop the existing table in the IRC. There were only three configurations tested: ½" lag screw with 15/32" OSB between the ledger and the band; ½" bolt with 15/32" OSB between the ledger and the band, and ½" bolt with ½" stack of washers and 15/32" OSB between the ledger and the band.

These three cases correspond to the three rows in the ledger table. Based on the testing, the additional gap can only be permitted in the third row of the table. The first two rows must have the ledger directly against wood structural panel sheathing or the band joist.

So we have revised the footnotes to do several things:

1. Re-arrange footnotes c and e so that they are footnotes a and b and they apply to the table title.
2. Add new footnote d that applies to the first two lines so that only wood structural panel or lumber sheathing is permitted between the ledger board and the band joist
3. Combine footnotes b and d from the original proposal into new footnote e, and change the reference so that it only applies to the last line in the table. Additional clarification was added that stacked washers can only be used with wood structural panel or lumber sheathing.

An article published in the December 2005 Building Safety Journal is included showing the basis for the existing table.

- Bibliography: "Wood Bits: Residential Deck Ledger Design". By David M. Carradine, Ph.D.; Donald A. Ph.D., P.E.,; Joseph R. Loferski, Ph.D.; and Frank E. Woeste, Ph.D., P.E.

RB265-13

Final Action: AS AM AMPC____ D

RB268-13
R507 (NEW)

Proposed Change as Submitted

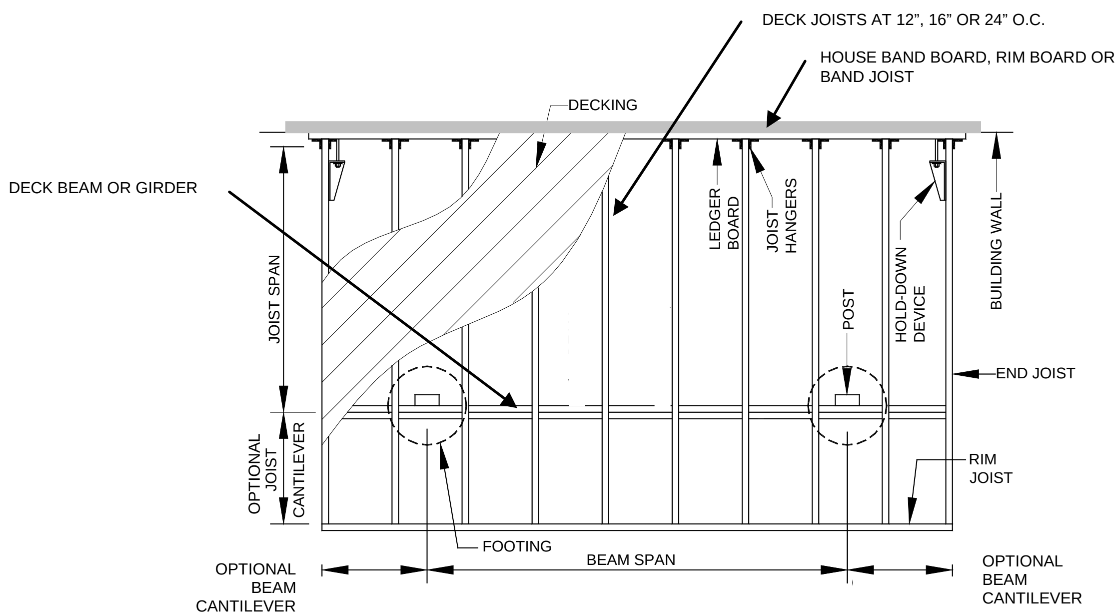
Proponent: Charles S. Bajnai, Chesterfield County, VA, representing self (bajnaic@chesterfield.gov), Randy Shackelford, Simpson Strong Tie (rshackelford@strongtie.com)

Add new text as follows:

SECTION R507
DECKS

R507.1 Wood decks. Typical wood decks shall be designed and constructed in accordance with this section. Other grades, species, loading, materials and conditions not described herein shall be permitted in accordance with Section 301. Loading for large concentrated loads, such as hot tubs, is beyond the scope of this section.

R507.2 Requirements. Deck construction shall be capable of accommodating applied loads and transmitting them to the supporting structural elements. Figure R507.2 is intended for purposes of identifying typical parts, and not to limit the design.



For SI: 1 inch = 25.4 mm

FIGURE R507.2
DECK CONSTRUCTION

R507.3 Materials. Materials used in the construction of a deck shall comply with the provisions of this section.

R507.3.1 Preservative-treated lumber. All lumber for decks shall be either naturally durable, minimum No.2 grade dimension lumber and identified in accordance with Section R502.1 or, preservative-treated in accordance with Section R317. All lumber in contact with the ground shall be identified as suitable for ground contact.

R507.3.2 Wood Decking. Wood decking shall comply with any of the following materials:

1. Wood decking with a minimum nominal thickness of 1 $^{1}/_{4}$ inches (32 mm) shall be installed at 90 degrees to deck joists that are spaced at a maximum of 16 inches (406 mm) on center and up to 45 degrees when spaced at a maximum of 12 inches (305 mm) on center.
2. Wood decking with a nominal 2 inch (51 mm) thickness shall be installed at an angle between 45 and 90 degrees to deck joists that are spaced at a maximum of 24 inches (610 mm) on center.
3. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.

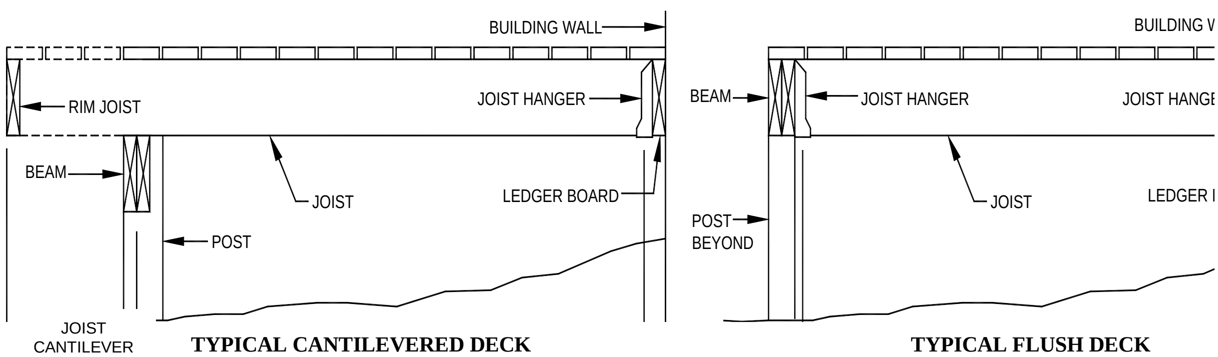
R507.3.3 Wood/plastic composites. Wood/plastic composites used as exterior deck boards, stair treads, handrails and guardrail systems shall be permitted in accordance with manufacturer's instructions.

R507.3.4 Metal guardrail systems. Metal guardrail and handrail systems shall be permitted in accordance with the manufacturer's instructions.

R507.3.5 Fasteners and connectors. Nails, bolts with nuts and washers, screws and connectors shall be coated in accordance with Section R317.3. Proprietary fasteners shall be permitted provided they are compatible with the pressure-preservative-treated lumber being used. Fasteners and connectors within 300 feet of salt water shoreline shall be stainless steel.

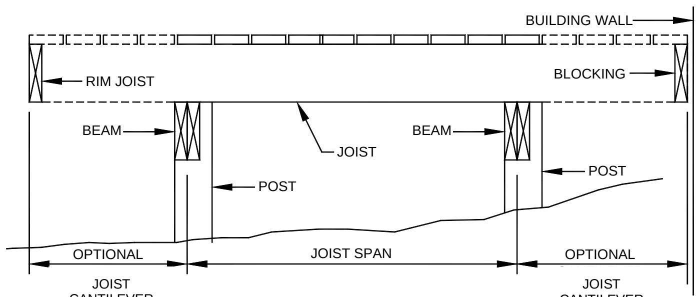
R507.3.6 Flashing. Flashing shall be corrosion-resistant metal of minimum nominal 0.019 inch (0.5 mm) thickness or approved non-metallic material.

R507.4 Deck joists. Spans for typical wood deck joist configurations, as shown in Figure R507.4, shall be in accordance with Table R507.4. Deck joists shall be permitted to cantilever a maximum of one-fourth of the joist span.



TYPICAL CANTILEVERED DECK **TYPICAL FLUSH DECK**

FIGURE R507.4
TYPICAL DECK JOIST SPANS



TYPICAL FREE STANDING DECK

TABLE R507.4
MAXIMUM DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES [a]	SIZE	MAXIMUM SPACING OF DECK JOISTS WITH NO CANTILEVER [b] (in.)			MAXIMUM SPACING OF DECK JOISTS WITH CANTILEVERS [c] (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	10-4	9-5	7-10	7-1	7-1	7-1
	2 x 8	13-8	12–5	10–2	10-9	10-9	10-2
	2 x 10	17-5	15–10	13–1	15-6	15-6	13-1
	2 x 12	18-0	18–0	15-5	18-0	18-0	15-5
Douglas fir-larch[d], hem-fir[d] spruce-pine-fir[d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine[e], red pine[e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. No. 2 grade with wet service factor.

b. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360.

c. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.

d. Includes incising factor.

e. Northern species with no incising factor

R507.4.1 Joist bearing. Joist ends shall be provided with vertical and rotational support. The ends of joists shall have a minimum of 1.5 inches (38 mm) of bearing on a wood ledger board or on metal hangers. Where rotational support is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where rotational support is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3)10d threaded nails or (3)#10x3 inch (76 mm) long wood screws. For free-standing decks, rotational support of the joist ends adjacent to the building wall shall be permitted by a rim joist or full depth nominal 2x blocking toe nailed at each end with (3)10d nails.

R507.5 Deck Beams. The maximum span for deck beams, as shown in Figure R507.2, shall be in accordance Table R507.5. Beams shall be permitted to cantilever at each end up to one-fourth of the beam span. The plies of a multi-ply beam shall be fastened with a minimum of two rows of 10d threaded nails at 16 inches (406 mm) on center along each edge. Splices of multi-span beams shall be located at interior post locations.

TABLE R507.5
MAXIMUM BEAM SPAN LENGTHS [a]

SPECIES	SIZE [b]	MAIN JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	7-1	6-2	5-6	5-0	4-8	4-4	4-1
	2-2x8	9-2	7-11	7-1	6-6	6-0	5-7	5-3
	2-2x10	11-10	10-3	9-2	8-5	7-9	7-3	6-10
	2-2x12	13-11	12-0	10-9	9-10	9-1	8-6	8-0
	3-2x6	8-7	7-8	6-11	6-3	5-10	5-5	5-2
	3-2x8	11-4	9-11	8-11	8-1	7-6	7-0	6-7
	3-2x10	14-5	12-10	11-6	10-6	9-9	9-1	8-7
	3-2x12	17-5	15-1	13-6	12-4	11-5	10-8	10-1
Douglas fir-larch [c], spruce-pine-fir,	3x6 or2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8

redwood [c], western cedars, ponderosa pine [d], red pine [d]	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Deck beams shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end .No 2 grade, wet service factor.

b. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

c. Includes incising factor.

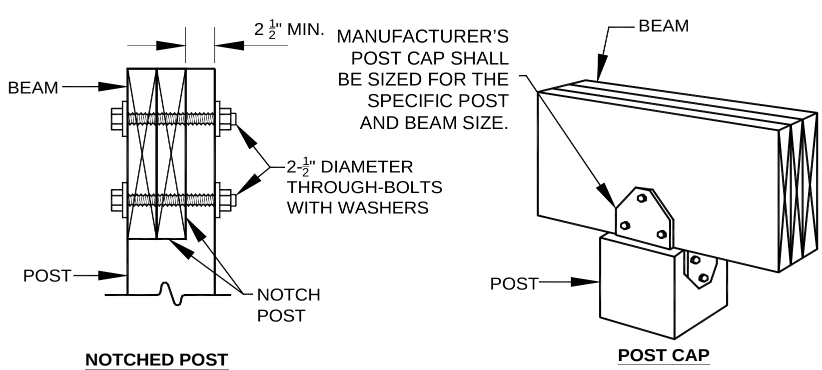
d. Northern species with no incising factor.

R507.5.1 Beam bearing. Single-ply beams and multi-ply beams shall have all of their bearing directly on wood posts or on an approved metal post cap in accordance with Figure R507.6.1 and not less than 3 inches (76 mm) on concrete or masonry.

R507.6 Deck posts. For typical single level wood decks, posts shall be measured from the top of the footing to the underside of the beam. The maximum height of the post shall be in accordance with the following:

1. Posts comprised of a minimum nominal 4x4 shall be permitted to a maximum height of 8 feet (2438 mm),
2. Posts comprised of a minimum nominal 6x6 shall be permitted to a maximum height of 14 feet (5486 mm).
3. Posts comprised of southern pine, of 4x4 or 4x6, grade #2 shall be permitted to a maximum height of 10 feet (3048 mm).
4. Posts comprised of southern pine, of 6x6 shall be permitted to a maximum height of 18 feet (5486 mm).

R507.6.1 Deck post to deck beam connection. Deck beams shall be attached to deck posts in accordance with Figure R507.6.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

FIGURE R507.6.1
TYPICAL BEAM BEARING

R507.7 Deck footings. Deck footings shall be constructed in accordance with Section R403 and Figure R507.7. The size of the footing shall be adequate for the load applied by the posts.

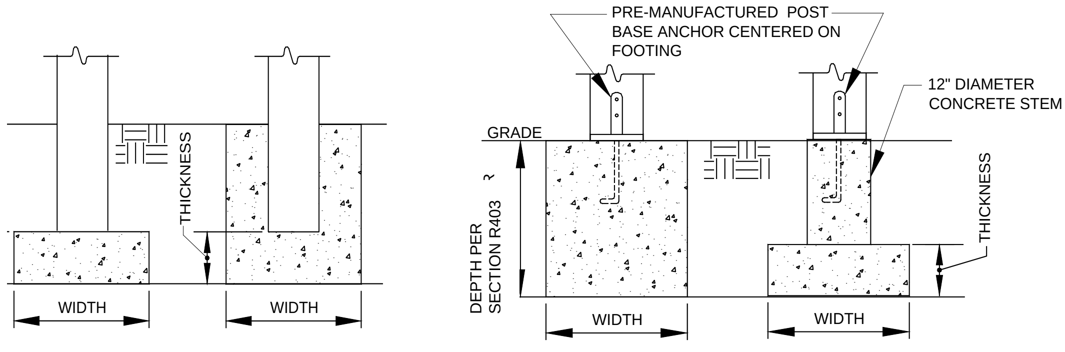


FIGURE R507.7
TYPICAL DECK FOOTINGS

R507.7.1 Footing depth. The minimum depth of footings shall be in accordance with Section R403.1.4 or as approved by the building official. A deck footing within 4 feet of the house shall be sit at least to the depth of the house footing.

R507.7.2 Post connection to footing. Where the top of the footings are at or above grade, the posts shall be prevented from being displaced by a connector between the post and the concrete. Where the top of the footings are below grade the post shall be permitted to sit on top of the footing or may be embedded in the concrete.

R507.8 Deck ledger connection to the building.. The connection between a deck ledger and the building shall be in accordance with this section.

R507.8.1 Deck ledger connection to band joist. The deck ledger shall be connected to a 2-inch nominal lumber band joist with ½-inch lag screws or bolts with washers in accordance with Table R507.8.1 and Figure R507.8.1(1). The bolts or lag screws shall be spaced in accordance with Figure R507.8.1(2). As an alternative to the detail in Figure R507.8.1, the ledger boards shall be permitted to be offset from the band joist a maximum distance of ½ inch (13 mm) with the installation of stacked washers. The exterior wall finish shall be removed prior to installation of the ledger board. Flashing at a door threshold shall be installed to prevent water intrusion from rain or melting ice and snow.

R507.8.2 Deck ledger connection to concrete foundation walls. A ledger board shall be connected to a concrete or solid masonry foundation wall with approved ½ inch (13 mm) diameter expansion anchors at a spacing specified in Table R507.8.1(1) and as shown in Figure R507.8.2. Expansion anchors shall be installed per the manufacturer.

R507.8.3 Ledger board to hollow masonry foundation wall. A ledger board shall be connected to a hollow masonry foundation wall with approved ½ inch (13 mm) diameter epoxy anchors at a spacing specified in Table R507.8.1(1) and as shown in Figure R507.8.3. Epoxy anchors shall be installed per the manufacturer.

R507.8.4 Alternate connections. An approved engineered wood rim board with a minimum thickness of 1 inch (25 mm) shall be permitted to substitute for a 2x lumber band joist provided it was designed and manufactured to support a deck. A ledger board attachment to a masonry or stone veneer, ribbon board of open web floor trusses, band joist of a cantilevered floor and other conditions not addressed herein shall be designed in accordance with accepted engineering practice, or the deck shall be free-standing in accordance with Section R507.10.

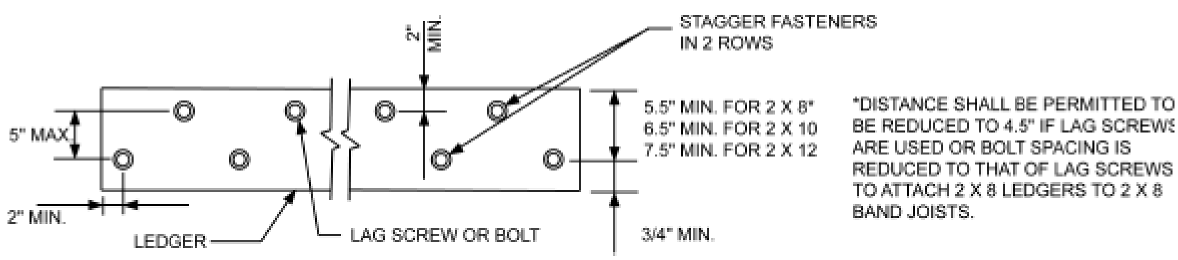
TABLE R507.8.1(1)
FASTENER SPACING

FASTENER	BAND BOARD	JOIST SPAN						
		≤6'	> 6'-8'	> 8'-10'	> 10'-12'	> 12'-14'	> 14'-16'	> 16'-18'
½" lag screws [a]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	30"	23"	18"	15"	13"	11"	10"
½" through bolts	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	34"	29"	24"	21"	19"
½" through bolts and ½" stacked washers [b]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	29"	24"	21"	18"	16"
Expansion anchors	-	36"	36"	34"	29"	24"	21"	19"
Epoxy anchors	-	32"	32"	32"	24"	24"	16"	16"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

a. The tip of the lag screw shall fully extend beyond the inside face of the band board.

b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inches (13 mm).



For SI: 1 inch = 25.4 mm.

FIGURE R507.8.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

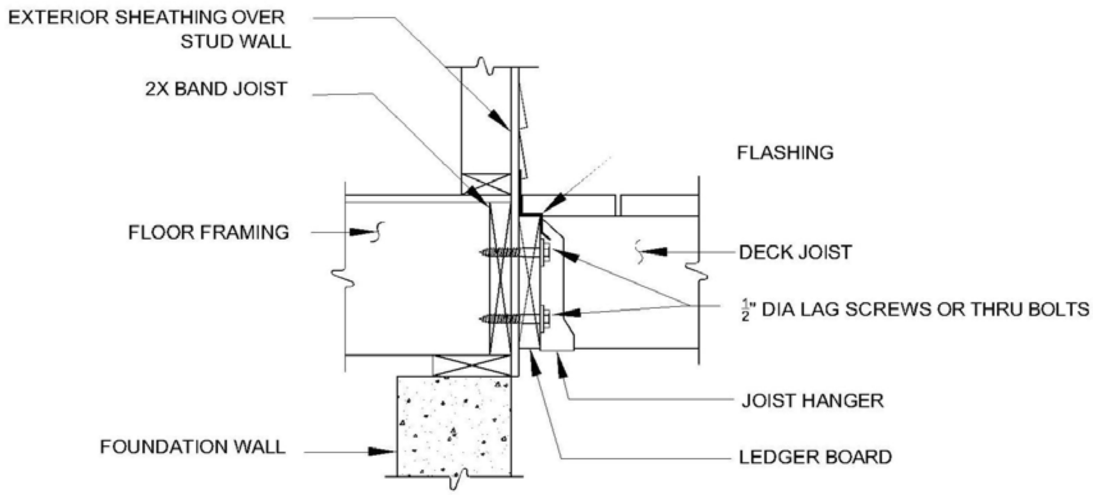


FIGURE R507.8.1(2)
LEDGER BOARD TO BAND BOARD ATTACHMENT

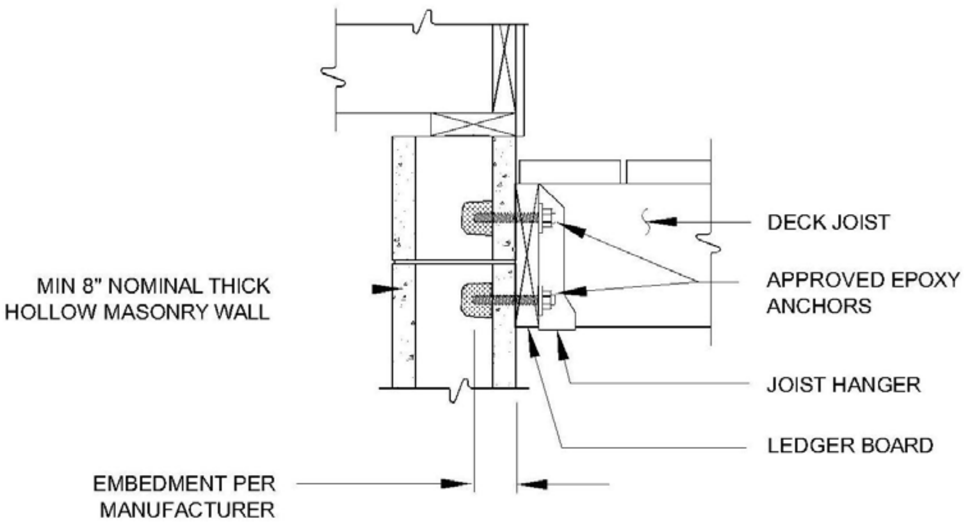


FIGURE R507.8.2
LEDGER BOARD TO SOLID FOUNDATION WALL ATTACHMENT

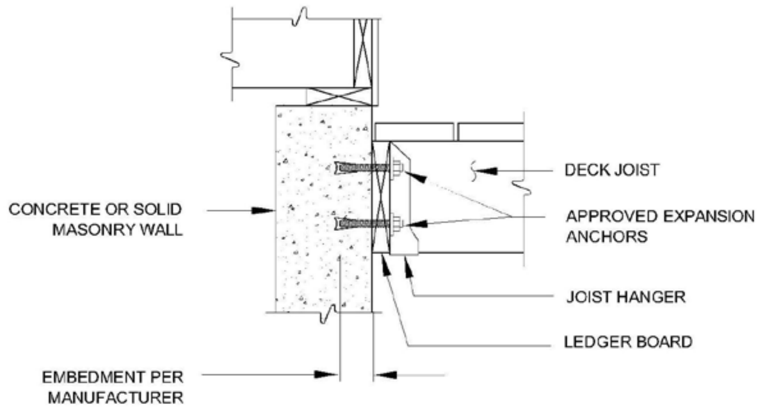
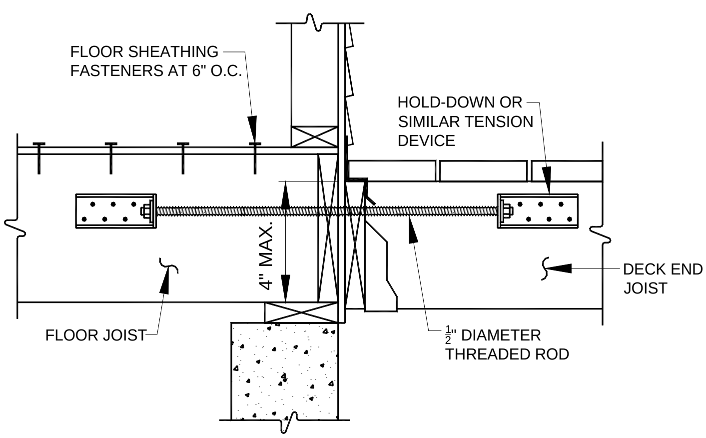


FIGURE R507.8.3
LEDGER BOARD TO HOLLOW MASONR FOUNDATION WALL ATTACHMENT

R507.9.3 Attachment to resist lateral load. A lateral load connection is required by Section R507.2. The following options shall be deemed to comply; other design solutions are permitted in accordance with R301.

R507.9.3.1 Connection at parallel joists. Where floor joists and deck joists are parallel, a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) at each end joist as shown in Figures R507.3.1(1) and R507.9.3.1(2) shall be permitted. Floor sheathing to floor joists fasteners shall be permitted to be substituted with two reinforcing angles on each side of the joist with a minimum capacity of 375 pounds (1668 N).



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.9.3.1(1)
CONNECTION AT PARALLEL JOISTS

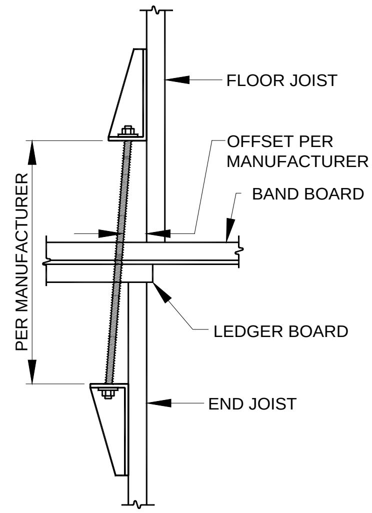
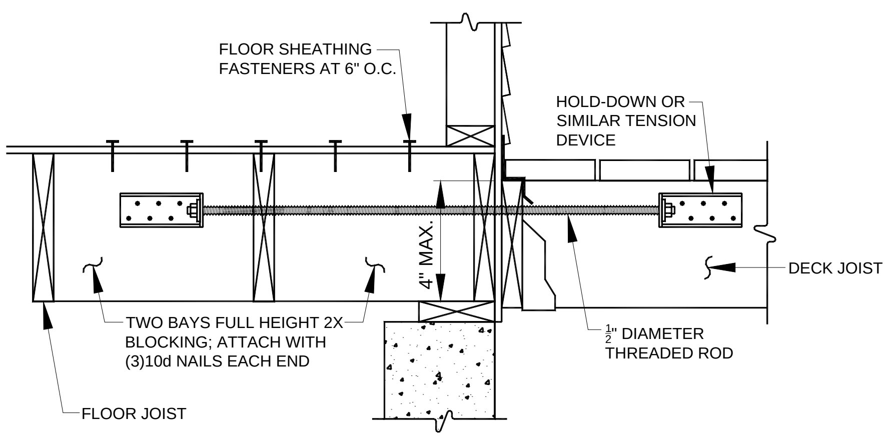


FIGURE R507.9.3.1(2)
OFFSET AT PARALLEL JOISTS

R507.9.3.2 Connection at perpendicular joists. Where floor joists and deck joists are perpendicular, provide a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) at each end joist and blocking between floor joists as shown in Figure R507.9.3.2. Floor sheathing to floor joists fasteners shall be permitted to be substituted with two reinforcing angles on each side of the joist with a minimum capacity of 375 pounds (1668 N).



For SI: 1 inch = 25.4 mm

FIGURE R507.9.3.2
LATERAL SUPPORT WHERE INTERIOR JOIST PERPENDICULAR TO DECK

R507.10 Free-standing decks. As shown in Figure R507.10, free-standing decks shall have an additional beam and posts adjacent the building exterior wall in place of a ledger board attachment. The beam shall be sized in accordance with Section R507.6 and shall be located adjacent the exterior wall or at a maximum distance equal to the allowable joist cantilever.

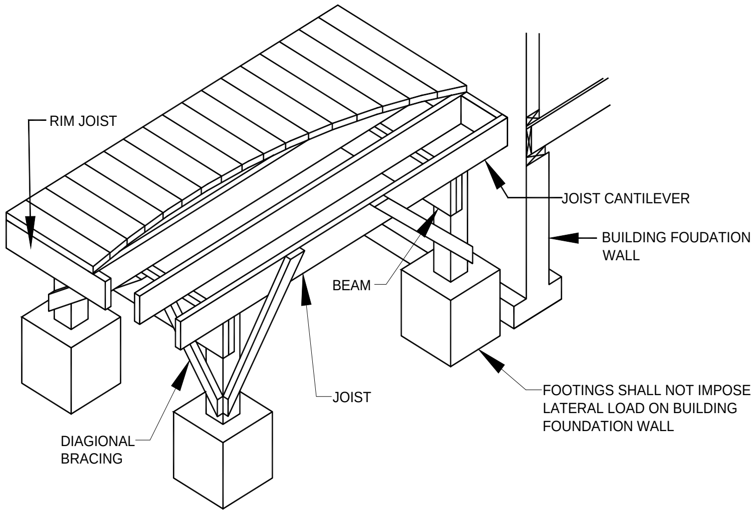
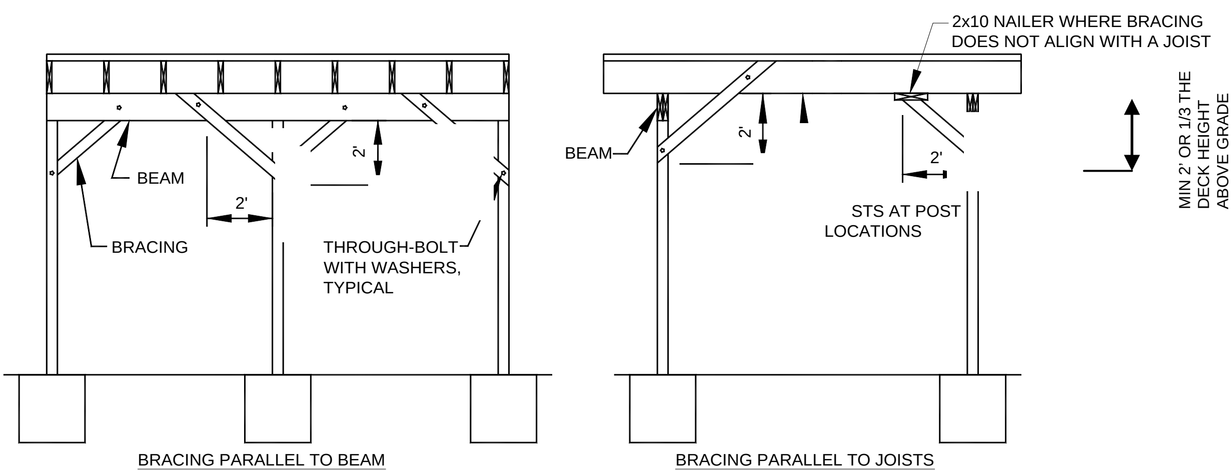


FIGURE R507.10
FREE-STANDING DECK

R507.10.1 Diagonal bracing. Diagonal bracing shall be installed on free-standing decks greater than 30 inches (762 mm) above grade in accordance with Figure R507.10.1. Bracing shall be placed at a 45 degree angle at each post location in the parallel and perpendicular directions to the beam. Bracing shall be a minimum of nominal 2x4 lumber and shall be fastened to framing with one 1/2 inch (9 mm) diameter through bolt with washers at each end. The diagonal brace shall be a minimum of 2 feet long measured as shown in Figure R507.10.1 or at least 1/3 the height of the deck above grade.

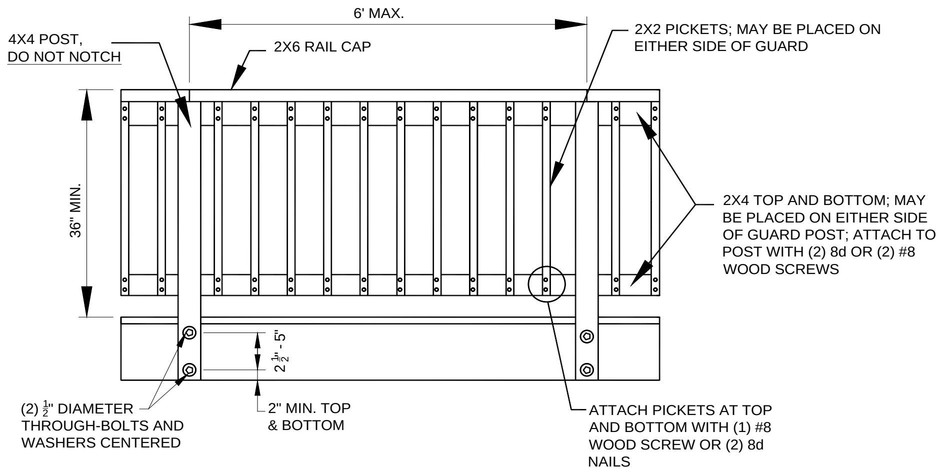


For SI: 1 foot = 304.8 mm

FIGURE R507.10.1
FREE-STANDING DECK DIAGONAL BRACING

R507.12 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. Other materials and construction techniques shall be permitted in accordance with Section R301.

R507.12.1 Guard construction. Where the guard requirements of Sections R301.5 and R312 are met using the details shown in Figures R507.12.1(1) through R507.12.1(3), guard posts shall be attached to the inside or outside face of the rim joist or end joist. Hold-down anchors shall have a minimum capacity of 1,800 pounds (8006 N).



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.12.1(1)
DECK GUARD

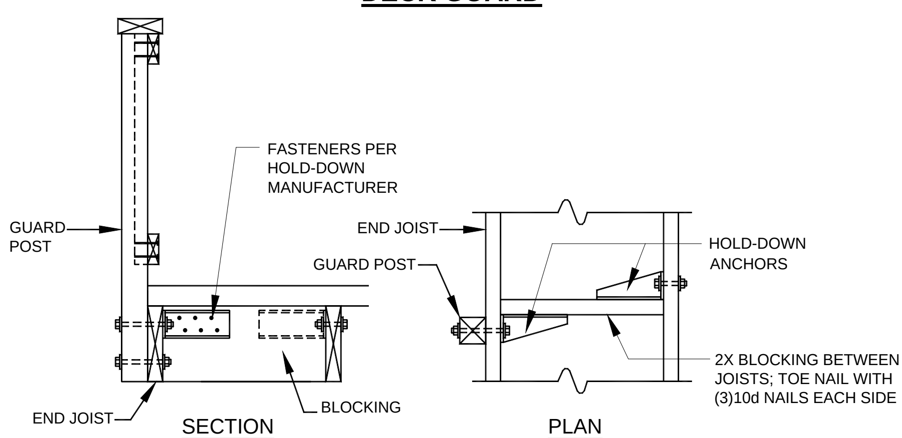


FIGURE R507.12.1(2)
GUARD POST TO END JOIST

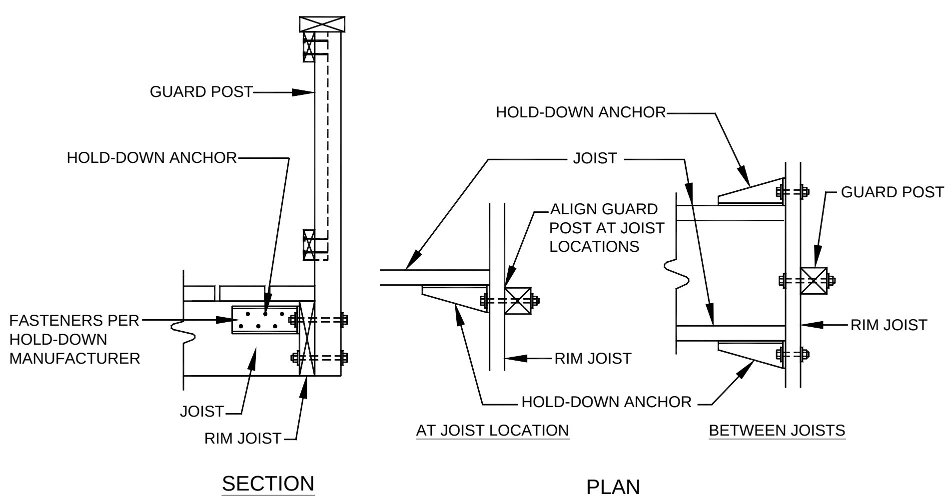
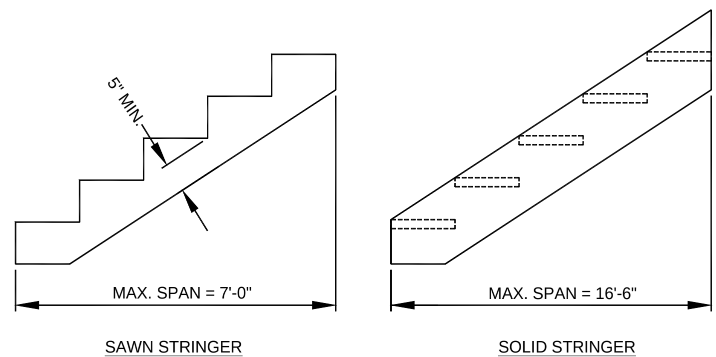


FIGURE R507.12.1(3)
GUARD POST TO RIM JOIST

R507.13 Deck stairs. Deck stairs shall be constructed in accordance with this section and Section R311.7. Where a flight of stairs has a vertical rise greater than that allowed per Section R311.7.3, an intermediate landing shall be provided in accordance with Section R311.7.6 and designed as a free-standing deck in accordance with Section R507.10.

R507.13.1 Stair stringers. Stair stringers shall be constructed of sawn nominal 2x12 members at 18 inches (457 mm) on center with a throat dimension of 5 inches (127 mm) and a maximum span length as shown in Figure R507.13.1. Stairs with a width equal to 36 inches (914 mm) shall be permitted to be constructed with two solid 2x12 stringers with a maximum span length as shown in Figure R507.13.1.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.13.1
STAIR STRINGER REQUIREMENTS

R507.13.2 Stringer bearing. Stringers shall be attached to posts or bear on joist hangers attached to the deck structure and on footings at grade in accordance with Figure R507.13.2. Joist hangers shall be specifically designed to accommodate sloped connections and shall have a minimum capacity of 625 pounds (2780 N). Reinforcing angles at rim joist locations only shall have a minimum capacity of 325 pounds (1446 N).

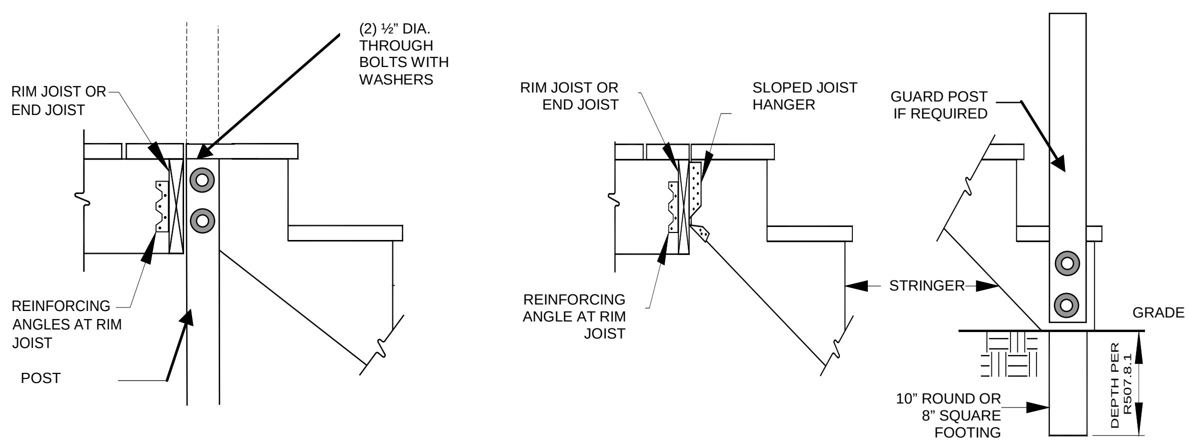


FIGURE R507.13.2
STRINGER BEARING

R507.13.3 Treads and risers. Stair treads shall be constructed in accordance with Section R311.7 and Figure R507.13.3. Treads shall be composed of nominal 2x6 lumber. Treads of stairs constructed with solid stringers shall be permitted to be composed of span rated decking. Risers shall be permitted to be composed of nominal 1x lumber. Openings in risers shall not allow the passage of a 4 inch (102 mm) diameter sphere.

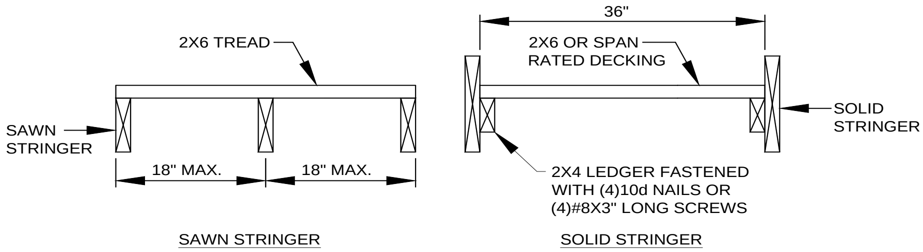
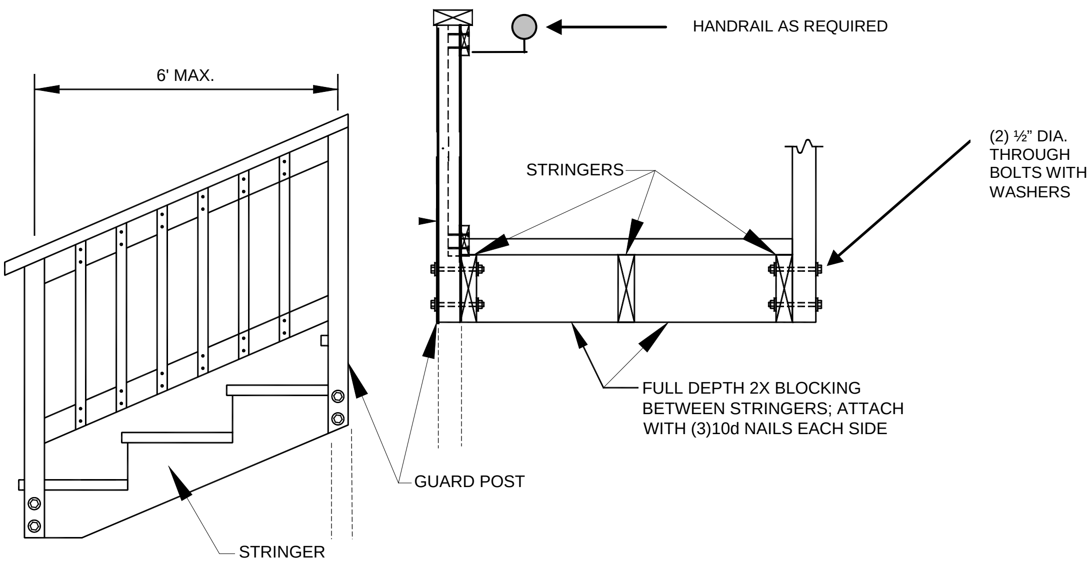


FIGURE R507.13.3
TREAD REQUIREMENTS

R507.13.4 Stair guard. Guards for stairs shall be as required per Section R312.1.1 and constructed in accordance with Section R507.12. The attachment of a stair guard post to the stringers shall be constructed in accordance with Figure R507.13.4.



For SI: 1 foot = 304.8 mm

FIGURE R507.13.4
STAIR GUARD CONNECTION

R507.13.5 Stair handrails. When required, handrails for stairs shall be as required per Section R311.7.8. When required and where the top guard rail does not comply with the handrail grip-size requirements in Section R311.7.8.3, a separate, conforming handrail shall be required.

R507.13.6 Ramps. Ramps from decks shall be as required in Section R311.8. Details for stringers, guards and handrails shall be similar to those for stairs.

Reason: With the increasing attention being paid to deck safety, the 2012 IRC took a major step forward by establishing a new Section R507 that covers deck construction. However, Section R507 consists almost entirely of connection details for anchoring the deck to the house, and does not provide any prescriptive requirements for building the deck itself. Some information is completely missing, like joist spans for naturally durable wood species, joist spans for wet lumber, beam spans, post sizes, bracing, footings and stair stringer spans.

Currently about one-third of the building permits pulled in our county are for decks. A significant number of these decks are built by homeowners or "handymen", rather than professional deck or home builders. Since the current code provides them no prescriptive guidelines, many jurisdictions across the country have tried to help either by creating locally developed deck guides or by directing the homeowner/builder to the *Prescriptive Residential Wood Deck Construction Guide (DCA6)*, a free document published by the American Wood Council (AWC).

Background on the *DCA6:* it is a document that originated in August 2006 when an ad-hoc task group was created to address prescriptive provisions for residential wood deck construction. While not a true consensus standard committee, the group was fairly balanced with representatives of ICC, AWC, home builders, municipal representative from Fairfax County, VA, construction hardware manufacturers, and the truss industry represented. The provisions of the *DCA6* gather requirements from throughout the IRC into one place, whether they be prescriptive requirements already contained in other sections, or new solutions derived from the performance provisions. A *Commentary* is also included in the document, to give the user an understanding of the data and/or experience upon which the provision is based.

While deck guides written outside the code development process have served a purpose, we think it is important that a set of deck construction provisions be contained in the IRC itself.

This submittal is based largely upon the provisions of the *DCA6*, with the intent to create a simple yet complete deck code section that provides prescriptive methods for safe deck construction. The submittal is presented in a simplified format so that it can be used by building officials, builders, inspectors and homeowners. The proponents recognize that every possible construction detail or condition is not covered by this submittal – the intent is to provide permitted methods for meeting the code, and not to preclude the use of other construction methods or materials that can always approved by the authority having jurisdiction using R104.11 or R301.

I have been privy to several other alternate deck proposals that are being considered for the 2015 IRC. My thought is that these proposals are well intentioned, but essential components were omitted for political reasons. Along with members of industry, I have developed what I believe to be a cleaner, more organized, more complete proposal with most of the same provisions of these other drafts and *DCA6* without the worry that some provisions might be politically improper to some constituents.

In conclusion, the average deck builder, plan reviewer and inspector have nothing in the IRC to help them with a deck design. Homeowners and non-professionals need to have simple prescriptive methods for building a safe deck, and we believe this proposal provides those guidelines.

Bibliography:

DCA6. http://www.awc.org/publications/DCA/DCA6/DCA6-09.pdf

Cost Impact: The code change proposal may increase the cost of construction.

R507-RB-BAJNAI-SHACKELFORD.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this is a needed change but there are too many technical flaws such as the diagonal bracing for lateral loads is lacking. The proponent's should work with industry to resolve any differences and bring it back.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

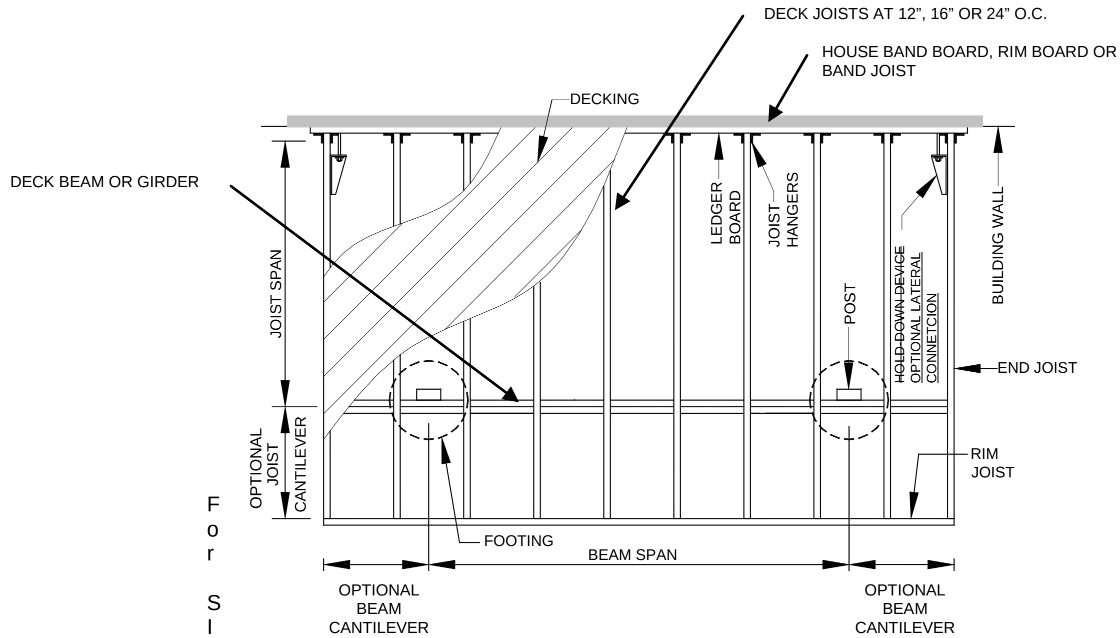
Chuck Bajnai, Chesterfield County, VA, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R507
DECKS

R507.1 Wood decks. ~~Typical wood decks~~ Decks of wood-frame construction shall be designed and constructed in accordance with this section. ~~Other grades, species, loading, materials and conditions~~ The use of other species of lumber or lesser grades of materials or different loading conditions not described herein shall be permitted in accordance with Section 301.1.1. ~~Loading for large concentrated loads, such as hot tubs, is beyond the scope of this section.~~

R507.2 Requirements. Deck construction shall be capable of accommodating ~~applied loads~~ all vertical and lateral loads in accordance with Section R301 and transmitting them to the supporting structural elements. Figure R507.2 is intended for purposes of identifying typical parts, and not to limit the design.



For SI: 1 inch = 25.4 mm

For SI: 1 inch = 25.4 mm

FIGURE R507.2
DECK CONSTRUCTION

R507.3 Materials. Materials used in the construction of a wood-framed deck shall comply with the ~~provisions~~ requirements of this section.

R507.3.1 ~~Preservative-treated l~~Lumber. All lumber shall be minimum No 2 grade dimension lumber. Lumber may be cut, drilled or notched in accordance with Section R502.8 except where prohibited in Section R507.11. In geographical areas where decay-resistant lumber is required, ~~All~~ lumber ~~for decks~~ shall be either naturally durable~~, minimum No.2 grade dimension lumber~~ and identified in accordance with Section R502.1, or~~,~~ preservative-treated in accordance with Section R317. ~~All lumber in contact with the ground shall be identified as suitable for ground contact.~~ Where termite-resistant lumber is required per Table R301.2 (1), lumber shall comply with Section R318.

~~**R507.3.2 Wood Decking.** Wood decking shall comply with any of the following materials:~~

1. ~~Wood decking with a minimum nominal thickness of $^5/_4$ inches (32 mm) shall be installed at 90 degrees to deck joists that are spaced at a maximum of 16 inches (406 mm) on center and up to 45 degrees when spaced at a maximum of 12 inches (305 mm) on center.~~
2. ~~Wood decking with a nominal 2 inch (51 mm) thickness shall be installed at an angle between 45 and 90 degrees to deck joists that are spaced at a maximum of 24 inches (610 mm) on center.~~
3. ~~Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.~~

R507.~~3.3~~ 3.2 ~~Wood/p~~Plastic composites. ~~Wood/p~~Plastic composite~~s used as exterior~~ deck boards, stair treads, ~~handrails and guardrail~~ guard and handrail systems shall ~~be permitted~~ comply with the requirements of R317.4 and installed in accordance with the manufacturer's installation instructions.

R507.~~3.4~~ 3.3 ~~Metal guardrail systems~~ Other materials. ~~Metal guardrail and handrail systems~~ Metal, glass, concrete or other materials used for deck construction, including guard and handrail systems shall be permitted in accordance with the requirements in Chapter 3 and installed in accordance with the manufacturer's installation instructions.

R507.~~3.5~~ 3.4 Fasteners and connectors. Nails, bolts with nuts and washers, screws, fasteners and connectors shall be ~~coated~~ protected in accordance with Section R317.3. ~~Proprietary fasteners shall be permitted provided they are compatible with the preservative-treated lumber being used.~~
~~Fasteners and connectors within 300 feet of salt water shoreline shall be stainless steel.~~ Fasteners and connectors shall be installed in accordance with manufacturer's installation instructions.

R507.~~3.6~~ 3.5 Flashing. Flashing shall be corrosion-resistant metal of minimum nominal 0.019 inch (0.5 mm) thickness or approved non-metallic material.

R507.4 Deck boards. Deck board spans shall comply with the requirements of Table R507.4. Wood deck boards shall be attached to each supporting member with a minimum of (2) 8d nails or (2) #8 wood screws.

TABLE R507.4
MAXIMUM DECK BOARD SPANS

MATERIAL TYPE AND NOMINAL SIZE	DECK BOARDS PERPENDICULAR TO JOIST	DECK BOARDS DIAGONAL TO JOIST[a]
5/4-inch thick wood	16 inches	12 inches
2-inch thick wood	24 inches	16 inches
Plastic composite	Per R507.3	Per R507.3

For SI: 1 inch = 25.4 mm

a. Maximum angle of 45 degrees from perpendicular for wood deck boards

R507.4 5 Deck joists. Spans for typical wood deck joist configurations~~,~~ shall be measured as shown in Figure R507.4 5, and shall ~~be in accordance with~~ not exceed the span lengths per Table R507.4 5. Deck joists shall be permitted to cantilever a maximum of one-fourth of the actual joist span.

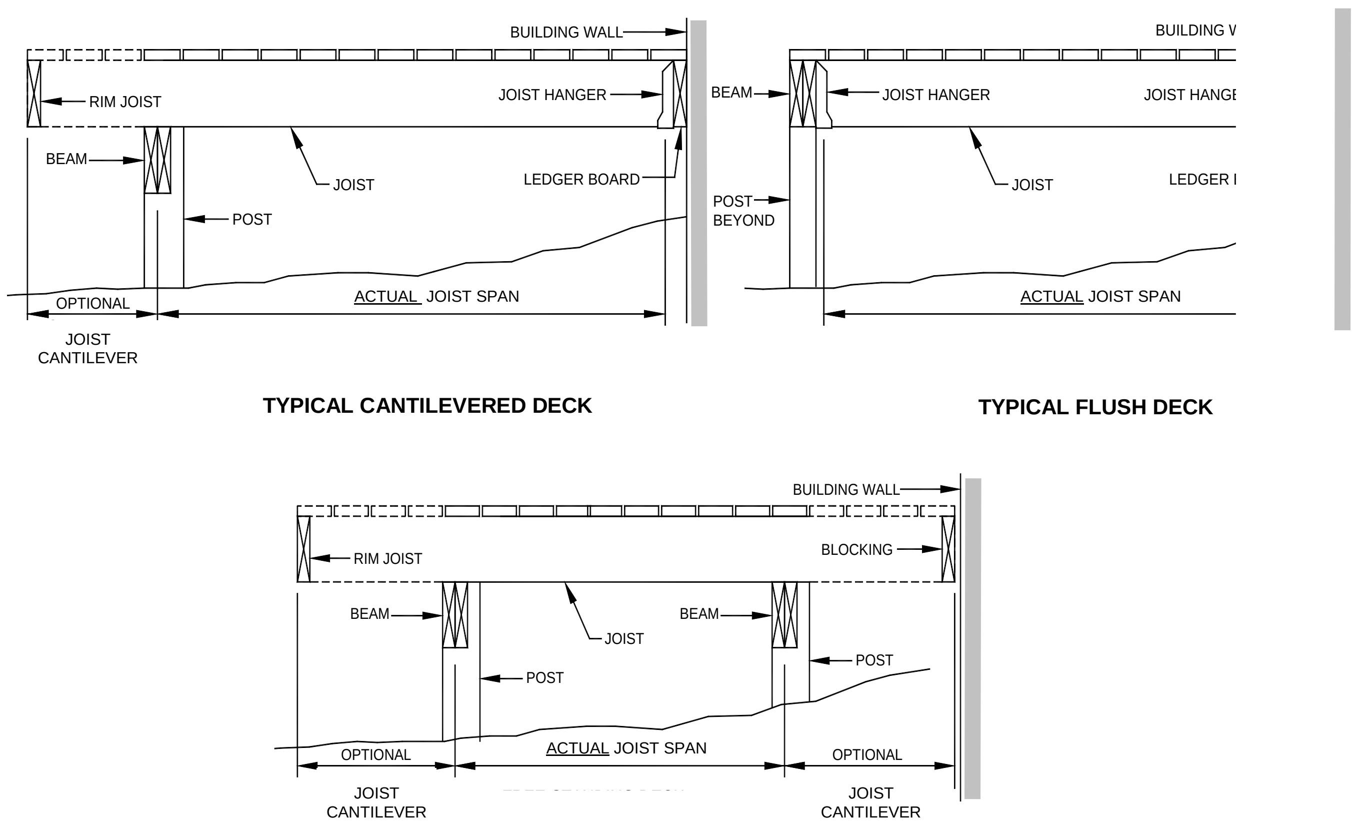


FIGURE R507.4 5
TYPICAL DECK JOIST CONFIGURATIONS

R507.~~4.1~~ 5.1 ~~Joist bearing~~ Deck joist support. ~~Joist ends~~ Ends of deck joists shall be ~~provided with~~ supported to prevent vertical and ~~rotational support.~~ lateral displacement. The ends of joists shall have a minimum of 1.5 inches (38 mm) of bearing on a deck beam, wood ledger board or on metal hangers. Joists shall be connected to deck beams with approved fasteners or connectors. Where ~~rotational~~ lateral support is provided by joist hangers or blocking between joists, ~~their~~ the depth of hanger or blocking shall equal not less than 60 percent of the joist depth. Where ~~rotational~~ lateral support is provided by rim joists, ~~they~~ the rim joist shall be secured to the end of each joist with a minimum of (3)10d ~~threaded~~ nails or (3)#10x3 inch (76 mm) long wood screws. ~~For free-standing decks, rotational support of the joist ends adjacent to the building wall shall be permitted by a rim joist or full depth nominal 2x blocking toe nailed at each end with (3)10d nails.~~

R507.~~5~~ 6 Deck Beams. The maximum ~~span for deck beams, as shown in Figure R507.2 shall be in accordance with Table R507.5~~ allowable deck beam span for single or multiple ply deck beams shall be in accordance with Table R507.6. Beams shall be permitted to cantilever at each end up to one-fourth of the adjacent beam span. The plies of a multi-ply beam shall be fastened with a minimum of two rows of 10d ~~threaded~~ nails at 16 inches (406 mm) or equivalent screws or bolts. ~~on center along each edge. Splices of multi-span beams shall be located at interior post locations.~~

TABLE R507.~~4~~ 5
MAXIMUM DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES [a]	JOIST SIZE	~~MAXIMUM SPACING OF~~ DECK JOIST SPACING WITHOUT ~~NO~~ CANTILEVER [b,f] (in.)			~~MAXIMUM SPACING OF~~ DECK JOIST SPACING WITH CANTILEVERS [c] (in.)		
		12" o.c.	16" o.c.	24" o.c.	12" o.c.	16" o.c.	24" o.c.
Southern pine	2 x 6	~~10-4~~ 9-11	~~9-5~~ 9-0	~~7-10~~ 7-7	~~7-1~~ 6-8	~~7-1~~ 6-8	~~7-1~~ 6-8
	2 x 8	~~13-8~~ 13-1	~~12–5~~ 11-10	~~10–2~~ 9-8	~~10-9~~ 10-1	~~10-9~~ 10-1	~~10-2~~ 9-8
	2 x 10	~~17-5~~ 16-2	~~15–10~~ 14-0	~~13–1~~ 11-5	~~15-6~~ 14-6	~~15-6~~ 14-0	~~13-1~~ 11-5
	2 x 12	18-0	~~18–0~~ 16-6	~~15-5~~ 13-6	18-0	~~18-0~~ 16-6	~~15-5~~ 13-6
Douglas fir-larch [d], hem-fir [d] spruce-pine-fir [d]	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11–1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13–7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15–9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine [e], red pine [e]	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10–7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13–0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. No. 2 grade with wet service factor.
b. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360.
c. Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
d. Includes incising factor.
e. Northern species with no incising factor.
f. Joists are permitted to cantilever from the deck beam by a length not to exceed the depth of the deck joist.

R507.~~5.1~~ 6.1 Beam bearing. Single-ply ~~beams~~ and multi-ply beams shall ~~have all of their bearing~~ bear directly on wood posts or on an approved metal post cap in accordance with Figure R507.~~6.1~~ 7.1 and not less than 3 inches (76 mm) on concrete or masonry walls or piers.

R507.~~6~~ 7 Deck posts. ~~For typical single level wood decks, p~~Posts shall be measured from the top of the footing to the underside of the beam. The maximum height of the post shall be in accordance with Table R507.7. ~~the following:~~

~~5. Posts comprised of a minimum nominal 4x4 shall be permitted to a maximum height of 8 feet (2438 mm).~~
~~2. Posts comprised of a minimum nominal 6x6 shall be permitted to a maximum height of 14 feet (5486 mm).~~
~~3. Posts comprised of southern pine, of 4x4 or 4x6, grade #2 shall be permitted to a maximum height of 10 feet (3048 mm).~~
~~4. Posts comprised of southern pine, of 6x6 shall be permitted to a maximum height of 18 feet (5486 mm).~~

TABLE R507.~~5~~ 6
MAXIMUM BEAM SPAN LENGTHS [a]

SPECIES	BEAM SIZE [b]	**MAXIMUM MAIN JOIST SPAN** (ft-in.) ~~**LESS THAN OR EQUAL TO:**~~						
		6 ft	8 ft	10 ft	12 ft	14 ft	16 ft	18 ft
Southern pine	(2) - 2x6	~~7-1~~ 6-11	~~6-2~~ 5-11	~~5-6~~ 5-4	~~5-0~~ 4-10	~~4-8~~ 4-6	~~4-4~~ 4-3	~~4-1~~ 4-0
	(2) - 2x8	~~9-2~~ 8-9	~~7-11~~ 7-7	~~7-1~~ 6-9	~~6-6~~ 6-2	~~6-0~~ 5-9	~~5-7~~ 5-4	~~5-3~~ 5-0
	(2) - 2x10	~~11-10~~ 10-4	~~10-3~~ 9-0	~~9-2~~ 8-0	~~8-5~~ 7-4	~~7-9~~ 6-9	~~7-3~~ 6-4	~~6-10~~ 6-0
	(2) - 2x12	~~13-11~~ 12-2	~~12-0~~ 10-7	~~10-9~~ 9-5	~~9-10~~ 8-7	~~9-1~~ 8-0	~~8-6~~ 7-6	~~8-0~~ 7-0
	2x6	~~8-7~~ 8-2	~~7-8~~ 7-5	~~6-11~~ 6-8	~~6-3~~ 6-1	~~5-10~~ 5-8	~~5-5~~ 5-3	~~5-2~~ 5-0
	(3) - 2x8	~~11-4~~ 10-10	~~9-11~~ 9-6	~~8-11~~ 8-6	~~8-1~~ 7-9	~~7-6~~ 7-2	~~7-0~~ 6-8	~~6-7~~ 6-4
	(3) - 2x10	~~14-5~~ 13-0	~~12-10~~ 11-3	~~11-6~~ 10-0	~~10-6~~ 9-2	~~9-9~~ 8-6	~~9-1~~ 7-11	~~8-7~~ 7-6
	(3) - 2x12	~~17-5~~ 15-3	~~15-1~~ 13-3	~~13-6~~ 11-10	~~12-4~~ 10-9	~~11-5~~ 10-0	~~10-8~~ 9-4	~~10-1~~ 8-10
Douglas fir-larch [c], spruce-pine-fir, redwood [c], western cedars, ponderosa pine [d], red pine [d]	(1) - 3x6 or (2) - 2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	(1) - 3x8 or (2) - 2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	(1) - 3x10 or (2) - 2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	(1) - 3x12 or (2) - 2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	(1) - 4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	(1) - 4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	(1) - 4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	(1) - 4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	(3) - 2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	(3) - 2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	(3) - 2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	(3) - 2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

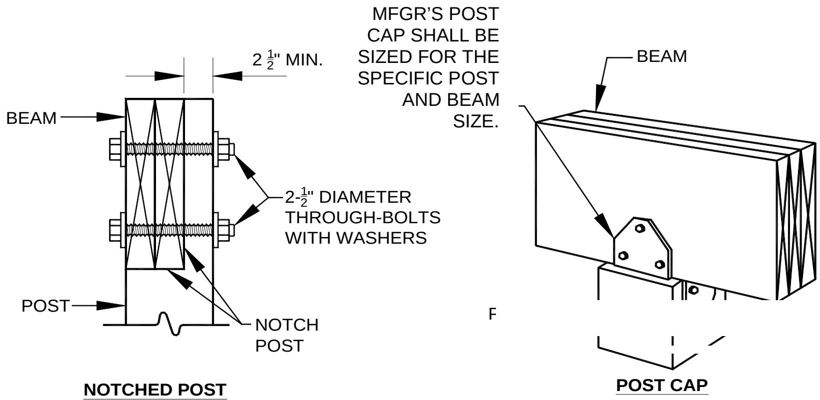
a. Deck beams shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end .No 2 grade, wet service factor.
b. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
c. Includes incising factor.
d. Northern species with no incising factor.

TABLE R507.7
DECK POST HEIGHT

NOMINAL DECK POST SIZE	MAXIMUM HEIGHT
4x4	8'
4x6	8'
6x6	14'

For SI: 1 foot = 304.8 mm.

507.~~6.1~~ 7.1 Deck post connection to deck beam ~~connection.~~ Deck beams shall be attached to wood deck posts in accordance with Figure R507.~~6.1~~ 7.1. Other optional ~~P~~post to beam connections shall be ~~constructed~~ permitted to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

FIGURE R507.~~6.1~~ 7.1
TYPICAL BEAM BEARING ON WOOD POST

R507.~~7~~ 8 Deck footings. Deck footings shall be constructed in accordance with Section R403 ~~and Figure R507.7~~. The ~~size~~ cross sectional area of the footing shall be adequate to carry the load applied by the posts based on the bearing capacity of the soil.

R507.~~7.1~~ 8.1 Footing depth. The minimum depth of footings shall be in accordance with Section R403.1.4 or as approved by the building official~~. A deck footing within 4 feet of the house shall be sit at least to the depth of the house footing.~~ Where a deck footing is within 4 feet of an existing, adjacent footing, the deck footing shall bear at the same depth as the existing footing.

R507.~~7.2~~ 8.2 Deck ~~P~~post connection to footing. ~~Where the top of the footings are at or above grade, the posts shall be restrained to prevent lateral displacement at the bottom end of the post. Where the top of the footings are below grade the post shall be permitted to sit on top of the footing or may be embedded in the concrete.~~ Deck posts shall be restrained to prevent lateral displacement at the bottom end. Such lateral restraint shall be provided by manufactured connectors or a minimum post embedment of 12-inches in surrounding soils or concrete as shown in Figure R507.8.2.

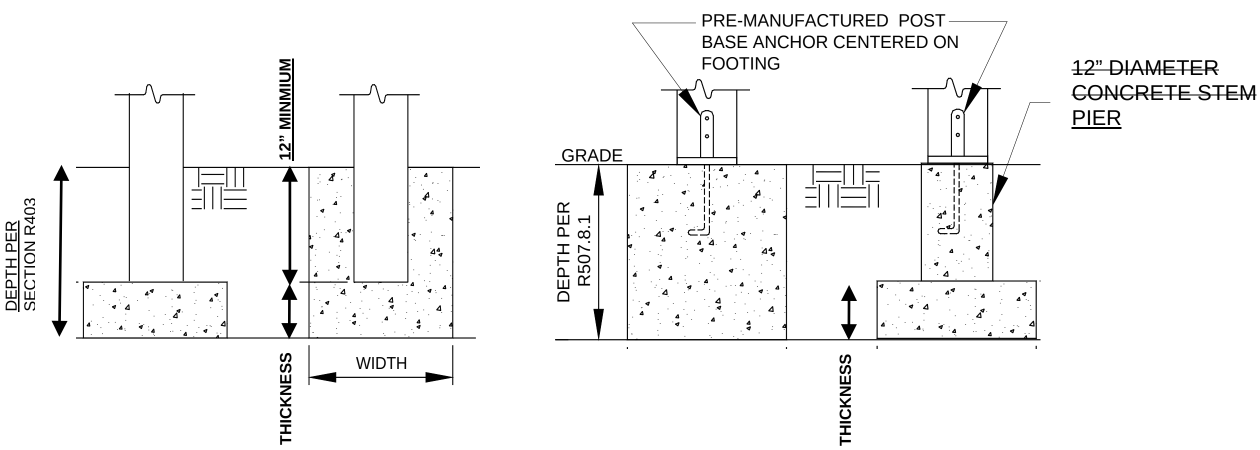


FIGURE R507.~~7.7~~ 8.2
TYPICAL DECK FOOTINGS

R507.~~8~~ 9 Deck ledger board connection to the building. The connection between a deck ledger board and the building shall be in accordance with this section.

R507.~~8.1~~ 9.1 Deck ledger board connection to band joist. The deck ledger board shall be connected to a nominal 2-inch thick ~~nominal~~ lumber band joist with ½-inch lag screws or bolts with washers in accordance with ~~Table R507.8.1 and~~ Figures R507.9.1(1) and R507.9.1(2) and ~~. .2 The bolts or lag screws shall be~~ spaced in accordance with ~~Figure R507.8.1 (2).~~ Table R507.9.1. As an alternative to the detail in Figure R507.~~8.1~~ 9.1(2), the ledger board shall be permitted to be offset from the house band joist or exterior sheathing a maximum distance of ½ inch (13 mm) with the installation of stacked washers.

The exterior wall finish shall be removed prior to installation of the ledger board. Flashing at a door threshold shall be installed to prevent water intrusion from rain or melting ice and snow.

R507.~~8.2~~ 9.2 Deck ledger board connection to concrete foundation walls. A ledger board shall be connected to a concrete or solid masonry foundation wall with approved ½ inch (13 mm) diameter ~~expansion~~ anchors ~~at a spacing specified~~ spaced in accordance with Table R507.~~8.1(1)~~ 9.1 and as shown in Figure R507.~~8.2~~ 9.2. ~~Expansion~~ Adhesive or mechanical ~~A~~ anchors shall be installed per the manufacturer's installation instructions.

R507.~~8.3~~ 9.3 Ledger board connection to hollow masonry foundation wall. A ledger board shall be connected to a hollow masonry foundation wall with approved ½ inch (13 mm) diameter ~~epoxy anchors at a spacing specified in Table R507.8.1(1)~~ anchors spaced in accordance with Table R507.9.1 and as shown in Figure R507.~~8.3~~ 9.3. ~~Epoxy~~ Adhesive or mechanical anchors shall be installed per the manufacturer's installation instructions.

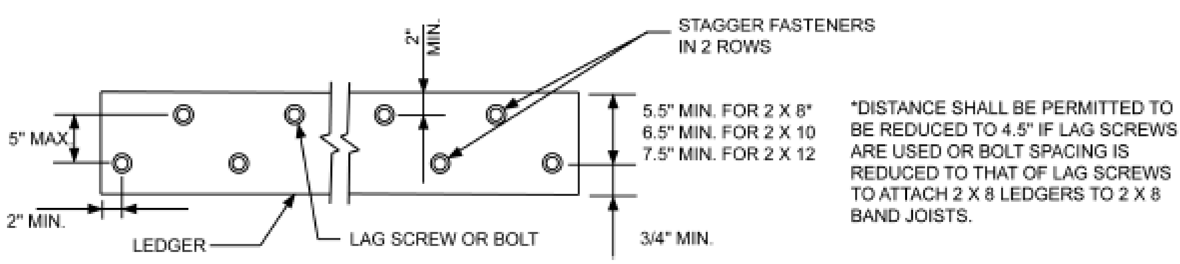
R507.~~8.4~~ 9.4 Alternate connections. An ~~approved~~ engineered wood rim board with a minimum thickness of 1 inch (25 mm) shall be permitted to substitute for a 2x lumber band joist provided ~~it~~ the engineered wood rim board was designed ~~and~~ by the manufacturer~~ed~~ to support a deck. A ledger board attachment to a masonry or stone veneer, ribbon board of open web floor trusses, band joist of a cantilevered floor ~~and~~ or other conditions not addressed herein shall be designed in accordance with accepted engineering practice, or the deck shall be free-standing in accordance with Section R507.10.

TABLE R507.~~8.1(1)~~ 9.1
FASTENER SPACING

FASTENER	BAND BOARD	JOIST SPAN						
		≤6'	> 6'-8'	> 8'-10'	> 10'-12'	> 12'-14'	> 14'-16'	> 16'-18'
½" lag screws [a]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	30"	23"	18"	15"	13"	11"	10"
½" through bolts	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	34"	29"	24"	21"	19"
½" through bolts and ½" stacked washers [b]	1" min. engineered wood product	24"	18"	14"	12"	10"	9"	8"
	2x lumber	36"	36"	29"	24"	21"	18"	16"
~~Expansion~~ Mechanical anchors [c]	-	36"	36"	34"	29"	24"	21"	19"
~~Epoxy~~ Adhesive anchors [d]	-	32"	32"	32"	24"	24"	16"	16"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

a. The tip of the lag screw shall fully extend beyond the inside face of the band board.
b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inches (13 mm).
c. Mechanical anchors shall have a minimum allowable shear of 725 pounds, and a minimum allowable tension of 505 pounds
d. Adhesive anchors shall have a minimum allowable shear of 675 pounds, and a minimum allowable tension of 505 pounds.



For SI: 1 inch = 25.4 mm.

FIGURE R507.~~8.1(1)~~ 9.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGER~~S~~ BOARDS

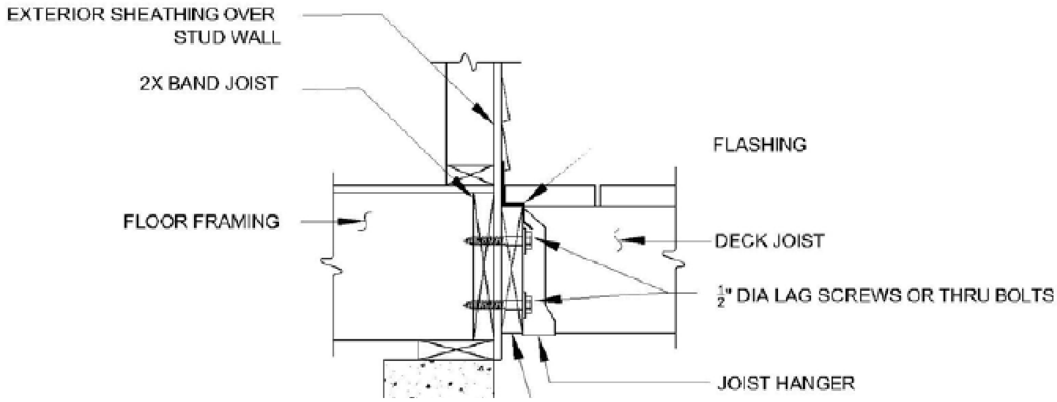


FIGURE R507.~~8.1(2)~~ 9.1(2)
LEDGER BOARD TO BAND BOARD ATTACHMENT

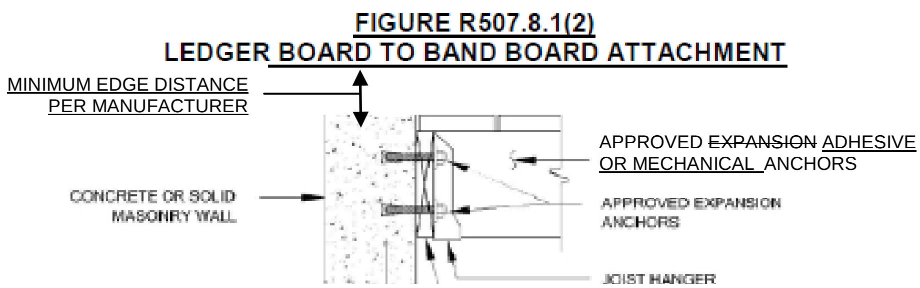


FIGURE R507.~~8.3~~ 9.2
LEDGER BOARD TO SOLID ~~HOLLOW~~ MASONRY FOUNDATION WALL ATTACHMENT

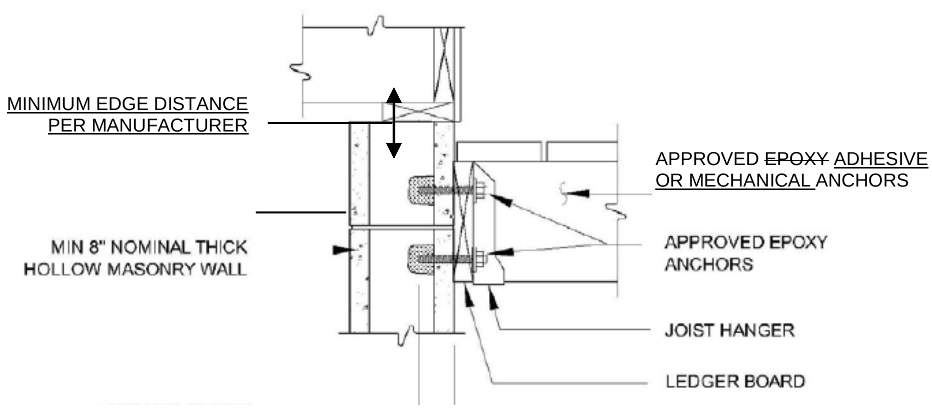


FIGURE R507.~~8.2~~ 9.3
LEDGER BOARD TO ~~SOLID~~ HOLLOW MASONRY FOUNDATION WALL ATTACHMENT

R507.~~9.3~~ 9.5 Attachment to resist lateral load. A lateral load connection is required by Section R507.2. The following ~~options~~ connections shall be deemed to comply; other design solutions are permitted in accordance with R301.

R507.~~9.3.1~~ 9.5.1 Connection at parallel joists. Where floor joists and deck joists are parallel to each other, a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) ~~at each end joist~~ as shown in Figures ~~R507.3.1(1)~~ R507.9.5.1(1) and R507.~~9.3~~ 9.5.1(2) shall be permitted. The hold-down device shall be located within 24 inches of each end joist. ~~Floor sheathing to floor joists~~ The floor sheathing fasteners shall be permitted to be substituted with two reinforcing angles with a minimum capacity of 375 pounds (1668 N) each on each side of the joist ~~with a minimum capacity of 375 pounds (1668 N)~~.

R507.~~9.3.2~~ 9.5.2 Connection at perpendicular joists. Where the floor joists and deck joists are perpendicular to each other, ~~provide~~ a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) ~~at each end joist and blocking between floor joist~~ shall be provided as shown in Figure R507.~~9.3.2~~ 9.5.2. The hold-down device shall be located within 24 inches of each end joist. The ~~F~~floor sheathing ~~to floor joists fasteners~~ shall be permitted to be substituted with two reinforcing angles ~~on each side of the joist with a minimum capacity of 375 pounds (1668 N~~ with a minimum capacity of 375 pounds (1668 N) each on each side of the joist.

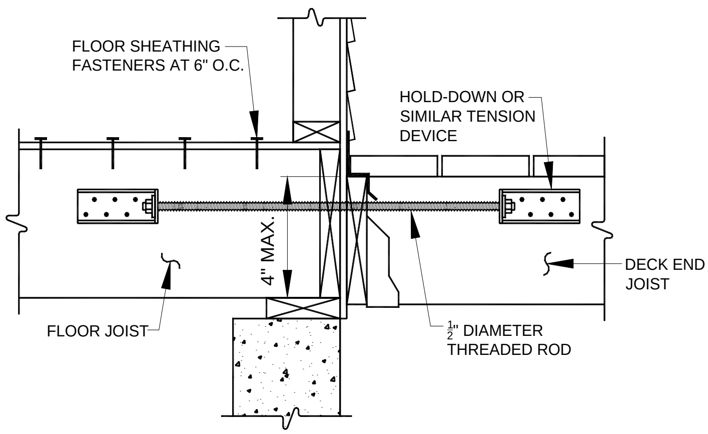


FIGURE R507.~~9.3.1(1)~~ 9.5.1(1)
CONNECTION AT PARALLEL JOISTS

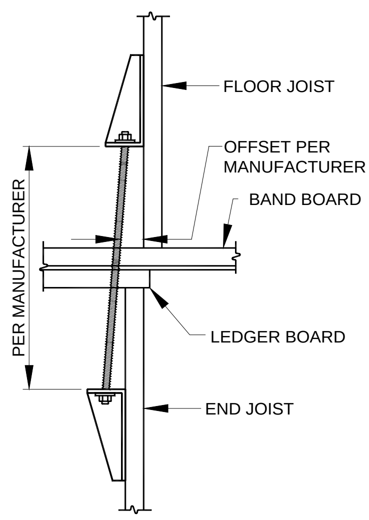
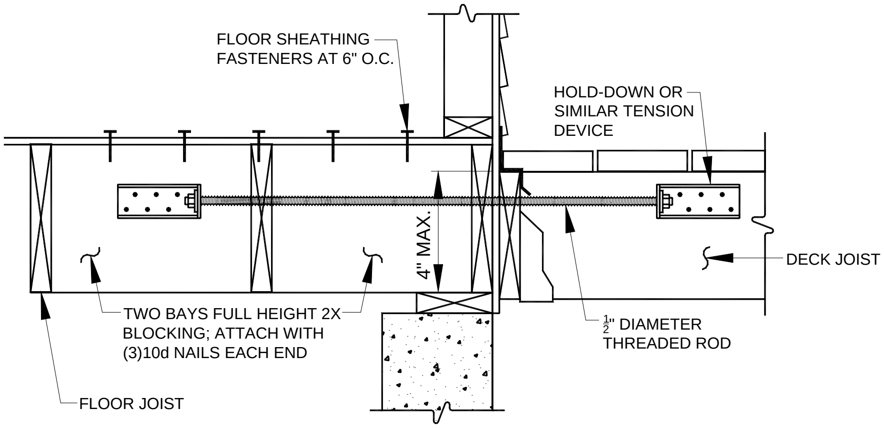


FIGURE R507.~~9.3.1(2)~~ 9.5.1(2)
OFFSET AT PARALLEL JOISTS



For SI: 1 inch = 25.4 mm

FIGURE R507.~~9.3.2~~ 9.5.2
LATERAL SUPPORT WHERE INTERIOR JOIST ARE PERPENDICULAR TO DECK

R507.10 Free-standing decks. As shown in Figures R507.5 and R507.10, free-standing decks shall ~~have an additional beam and posts adjacent the building exterior wall in place of a ledger board attachment.~~ transfer all of the deck loads directly to the footings. ~~The b~~Beams shall be sized in accordance with Section R507.6 ~~and shall be located adjacent the exterior wall or at a maximum distance equal to the allowable joist cantilever~~.

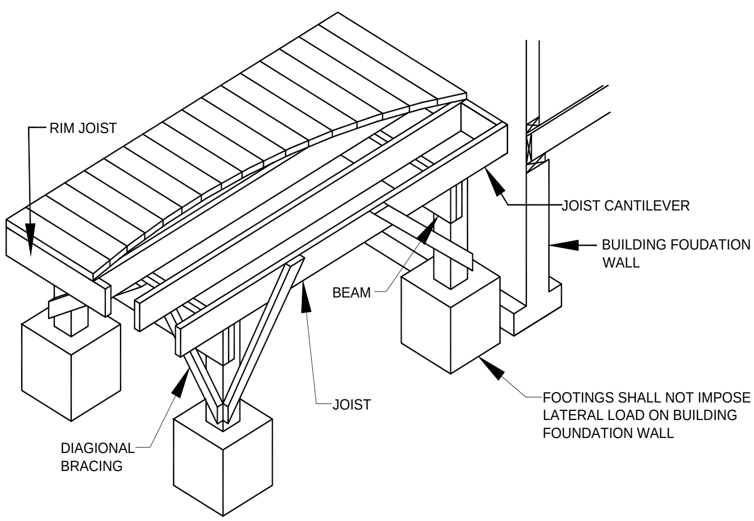
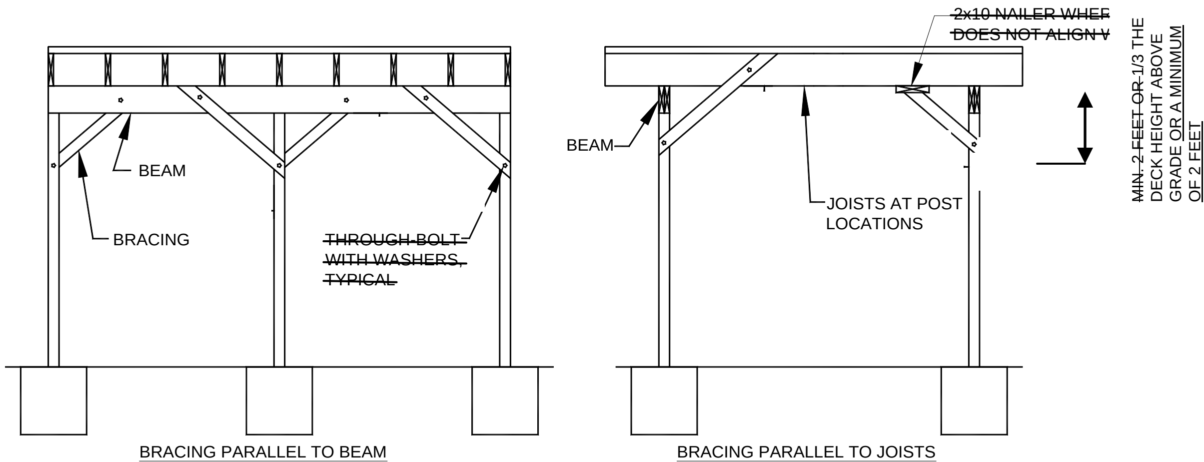


FIGURE R507.10
TYPICAL FREE-STANDING DECK

R507.10.1 Diagonal bracing. Diagonal bracing shall be ~~installed~~ provided in accordance with Figure R507.10.1 on free-standing decks greater than 30 inches above grade ~~in accordance with Figure R507.10.1~~. Bracing shall be placed at a 45 degree angle at each post location in the parallel and perpendicular directions to the beam. Bracing shall be constructed with ~~minimum of~~ nominal 2x4 lumber and shall be fastened to framing with one 1/2 inch (9 mm) diameter through bolt ~~with washers at each end~~ or by the use of other mechanical devices. The length of the diagonal brace shall be ~~a minimum of 2 feet long measured as shown in Figure R507.10.1 or at least~~ 1/3 the height of the deck above grade or a minimum of 2 feet.



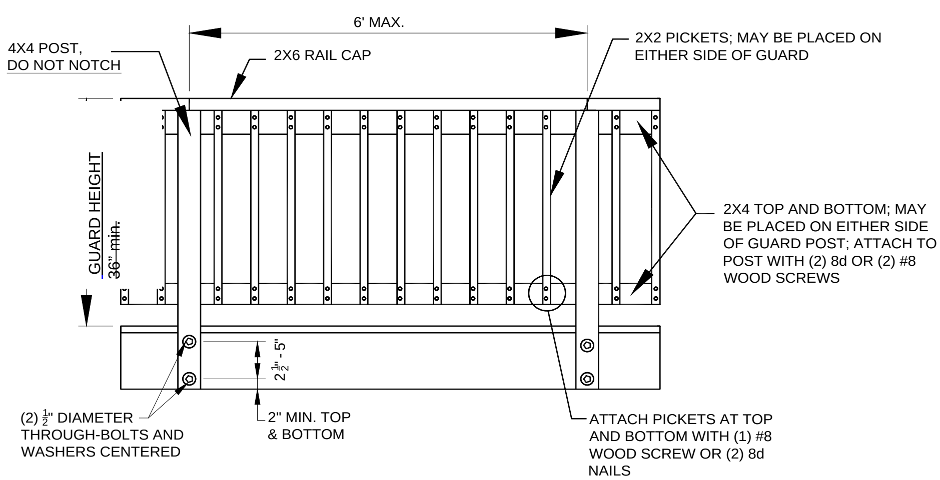
For SI: 1 foot = 304.8 mm

FIGURE R507.10.1
FREE-STANDING DECK DIAGONAL BRACING

R507.~~12~~ 11 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. Other materials and construction ~~techniques~~ details shall be permitted in accordance with Section R301. Wood deck guards shall not be notched.

R507.~~12.1~~ 11.1 Guard construction. ~~Where the guard requirements of Sections R301.5 and R312 are met using the details shown in Figures R507.12.1(1) through R507.12.1(3),~~ Guard posts shall be attached to the inside or outside face of the rim joist or end joist as shown in Figures R507.11.1(1) through R507.11.1(3), Hold-down ~~anchors~~ fasteners shall have a minimum capacity of 1,800 pounds (8006 N).

R507.11.2 Guard rail construction. The guard rail cap shall be nailed to the top of the guard post with a minimum of four 16d common nails or #12 by 3" long screws, or an alternate connection that will resist 200 pounds of shear force.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.~~12.1(1)~~ 11.1(1)
TYPICAL DECK GUARD

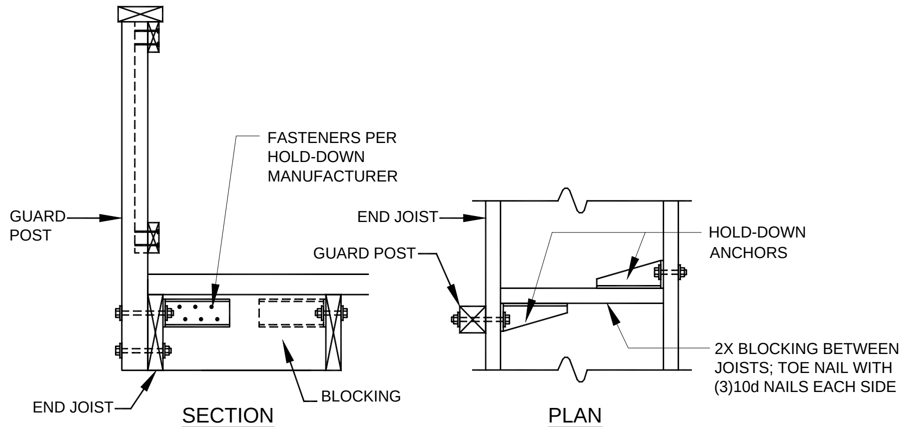


FIGURE R507.1~~2.1(2)~~ 11.1(2)
GUARD POST TO END JOIST CONNECTION

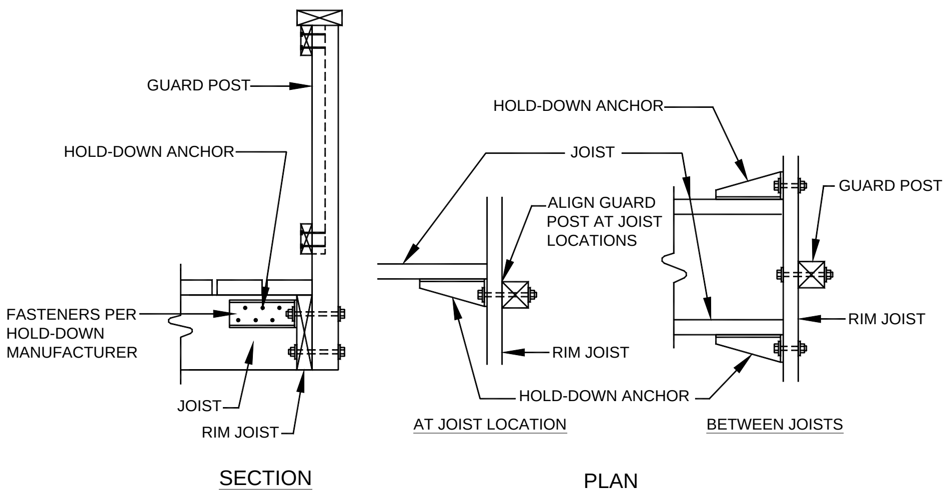
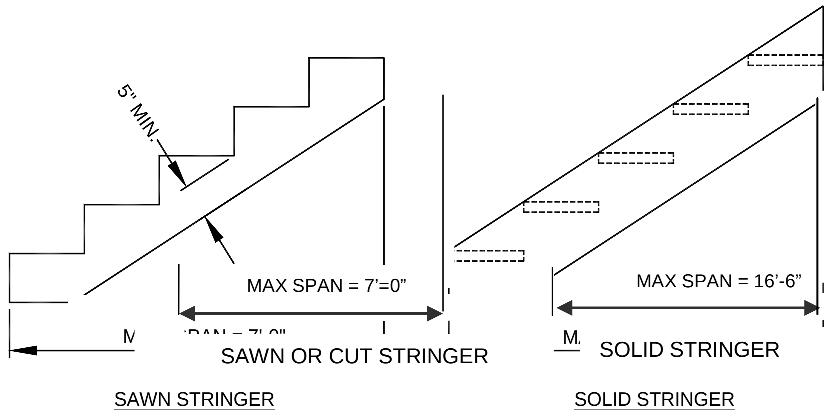


FIGURE R507.~~12.1(3)~~ 11.1(3)
GUARD POST TO RIM JOIST CONNECTION

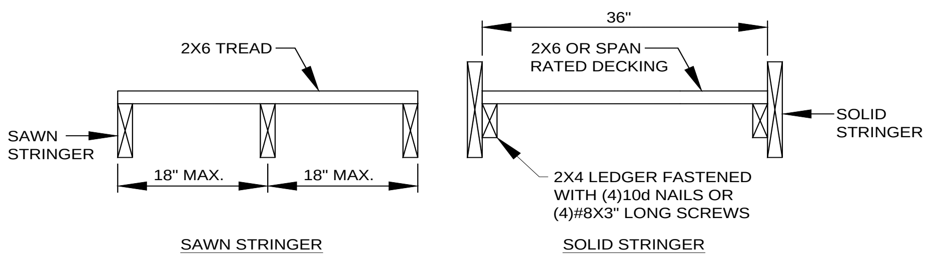
R507.~~13~~ 12 Deck stairs. Deck stairs shall be constructed in accordance with this section and Section R311.7. Where a flight of stairs has a vertical rise greater than that allowed per Section R311.7.3, an intermediate landing shall be provided ~~in accordance with Section R311.7.6 and designed as a free-standing deck in accordance with Section R507.10~~.

R507.~~13.1~~ 12.1 Stair stringers. Stair stringers shall be constructed of ~~sawn~~ nominal 2x12 ~~members at 18 inches on center with a throat dimension of 5 inches and a maximum span length~~ lumber as shown in Figures R507.~~13.1~~ 12.1(1) and R507.12.1(2) ~~Stairs with a width equal to 36 inches shall be permitted to be constructed with two solid 2x12 stringers wit a maximum span length as shown in Figure R507.13.1.~~ Stringers with spans greater than those shown in Figure R507.12.1(1) shall be supported with intermediate posts and footings spaced along its length.



~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8mm~~

FIGURE R507.13.1 12.1(1)
STAIR STRINGER REQUIREMENTS



For SI: 1 inch = 25.4 mm

FIGURE R507.~~13.3~~ 12.1(2)
~~TREAD~~ STRINGER WIDTH REQUIREMENTS

~~**R507.13.2 Stringer bearing.** Stringers shall be attached to posts or bear on joist hangers attached to the deck structure and on footings at grade in accordance with Figure R507.13.2. Joist hangers shall be specifically designed to accommodate sloped connections and shall have a minimum capacity of 625 pounds (2780 N). Reinforcing angles at rim joist locations only shall have a minimum capacity of 325 pounds (1446 N).~~

~~**FIGURE R507.13.2**~~
~~**STRINGER BEARING**~~

R507.~~13.3~~ 12.2 Treads and risers. Stair treads shall be constructed in accordance with Section R311.7 and Figure R507.~~13.3~~ 12.1(2). Treads shall be composed of nominal 2x~~6~~ lumber or plastic composites. ~~Treads of stairs constructed with solid stringers shall be permitted to be composed of span rated decking.~~ Risers shall be permitted to be composed of nominal 1x lumber. Openings in risers shall not allow the passage of a 4 inch (102 mm) diameter sphere.

R507.~~13.4~~ 12.3 Stair guards. Guards for stairs shall be as required per Section R312.1.1 ~~and constructed in accordance with Section R507.12. The attachment of a stair guard post to the stringers shall be constructed in accordance with Figure R507.13.4~~.

~~**FIGURE R507.13.4**~~
~~**STAIR GUARD CONNECTION**~~

R507.~~13.5~~ 12.4 Stair handrails. ~~When required, handrails for stairs shall be as required~~ A stair handrail may be required per Section R311.7.8. ~~When required and where the top guard rail does not comply with the handrail grip-size requirements in Section R311.7.8.3, a separate, conforming handrail shall be required.~~ When a guard is required in accordance with Section R312.1.1, the top rail shall comply with the handrail grip size requirements of Section R311.7.8.3 or a separate handrail shall be provided.

R507.~~13.6~~ 13 Ramps. Ramps from decks shall be as required in Section R311.8. Details for stringers, guards and handrails shall be similar to those for stairs.

Commenter's Reason: This proposal was originally submitted to address the lack of prescriptive deck construction details in the IRC. Prescriptive details are needed in the code to help the "weekend warrior" or other inexperienced builders who do not build decks on a regular basis. The construction of safe decks is an important issue that warrants inclusion in the IRC.

The committee in Dallas agreed that Section R507 was woefully deficient in providing minimum prescriptive deck criteria. This public comment integrates many comments from multiple interested parties.

Arguing in support of this proposal in Dallas, several proponents rightfully pointed out that many jurisdictions across the country have deferred to DCA6 as an acceptable guide for building decks. In the absence of IRC criteria, DCA6 was a respected alternative. This submission is based on many of the provisions in DCA6.

The opponents in Dallas argued that some of the details were different than those used in their parts of the country. They missed the opening sentences in the first section – that this proposed code change was intended to provide 1) *typical* requirements and details and 2) other materials and methods were equally acceptable. It was argued that providing minimum requirements for the average homeowner in no way was intended to stifle deck craftsmen.

Numerous examples of engineered solutions and commonly accepted details have been sent to me from many parts of the country. There are YouTube videos from well established stores, like Home Depot, that are offering "how to" videos that are teaching the average homeowner wrong ways to build decks. Some of these are so egregiously wrong that they could jeopardize life safety. In the absence of good code, the handy homeowner will resort to anything – good or bad: to paraphrase a TV commercial: "everyone knows that everything on the internet is correct"

In conclusion, there are several public comments to RB 264 and RB268 being submitted to fill the void on how to build decks safely. There is a short version, a medium length version and this more complete version. We think that less is less, and more is better. We submit this longer version because the average deck builders, plan reviewers and inspectors have nothing in the IRC to help them with a deck design. Homeowners and non-professionals need to have simple prescriptive methods for building a safe deck, and we believe this proposal provides those guidelines.

I strongly recommend that you support RB268 so that we will have prescriptive criteria in the code for building decks.

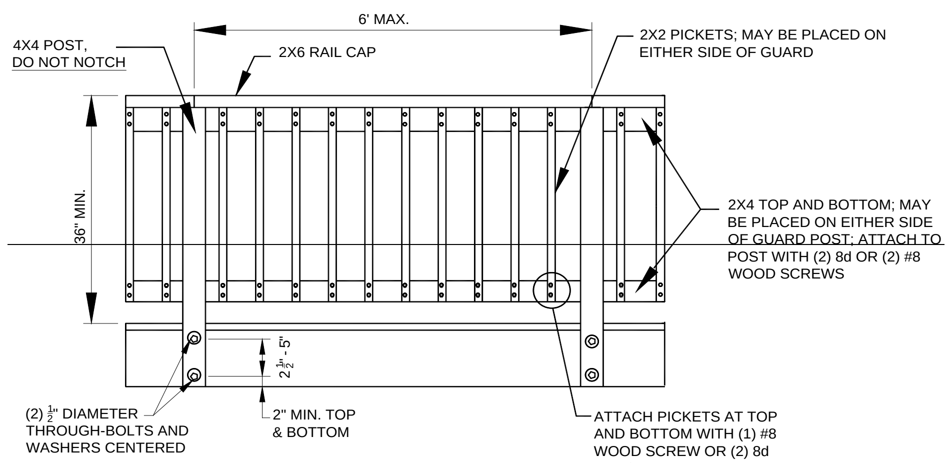
Public Comment 2:

Chuck Bajnai, Chesterfield County, VA, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

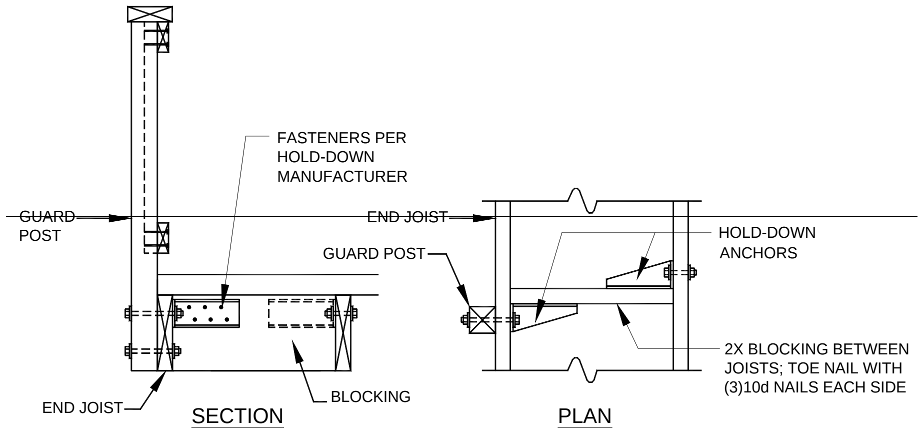
R507.12 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. ~~Other materials and construction techniques shall be permitted in accordance with Section R301.~~ <u>Deck guards shall not be notched.</u>

~~**R507.12.1 Guard construction.** Guard posts shall be attached to the inside or outside face of the rim joist or end as shown in Figures R507.12.1(1) through R507.12.1(3), Hold-down anchors shall have a minimum capacity of 1,800 pounds (8006 N).~~

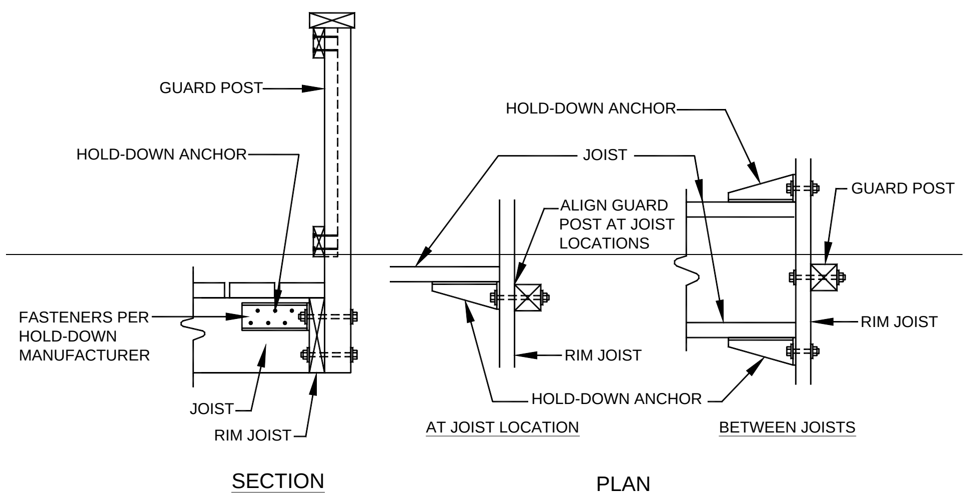


~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm~~

~~**FIGURE R507.12.1(1)**~~
~~**DECK GUARD**~~



~~FIGURE R507.12.1(2)~~
~~GUARD POST TO END JOIST~~



~~FIGURE R507.12.1(3)~~
~~GUARD POST TO RIM JOIST~~

Commenter's Reason: The guard post detail was created after extensive testing by Virginia Tech. The connector in the detail was the only solution they could get to pass the testing criteria for a guard rail. While other devices or details may be available, no one has provided engineering test data for any other options.

Having said that, a major objection to RB268 by the opponents was this guard-rim joist connection detail. As an effort to reach a compromise, I am requesting these details be deleted.

Public Comment 3:

John Orang, Barefoot Decks, representing self, requests Disapproval.

Commenter's Reason: We have been building decks in Colorado since 1994. During that time we have built hundreds of decks and learned a lot along the way.

When I heard of the new lateral post attachment method that is proposed for the 2015 IRC, I had to stop and take a hard look at it. We have spent several years addressing this very issue and in the past year have come up with our very own patent pending bracket that has tested very well. Our crews are very comfortable with the ease of use that this bracket offers and me. As the company owner, I am extremely happy with the stability of the rail as well as minimum deflection.

The reason I am writing a response to this hearing isn't to pitch my product but only to voice my opinion against being forced to use a product that in my opinion performs less favorably, especially when it comes to deflection.

I am sure there are a variety of methods to achieve the current 500 lb safety factor and forcing one product on thousands of creative deck builders seems to go against the grain of what we are all about.

Thanks for your consideration

RB268-13

Final Action: AS AM AMPC____ D

RB270-13
R602.3, R602.4

Proposed Change as Submitted

Proponent: Dennis St. Denis, D & L Quality Homes, representing self (lstdenis2@cogeco.ca)

Revise as follows:

R602.3 Design and construction. Exterior walls of woodframe construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Wall sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to DOC PS 1, DOC PS 2 or, when manufactured in Canada, CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and performance Category by a grade mark or certificate of inspection issued by an approved agency and shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice. <u>Load Bearing Warning Signs shall be installed on every second stud along the full length of the load bearing wall, at a height of 5 feet and attached with screws or nails.</u>

> **Exception:** Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R502.5(1) and R502.5(2).

R602.4 Interior load-bearing walls. Interior load-bearing walls shall be constructed, framed and fireblocked <u>and Load Bearing Warning Signs installed</u> as specified for exterior walls.

Reason: Load Bearing Walls and Load Points are being removed by homeowners and contractors during renovations and also being cut into by sub-contractors during new home construction or renovations without knowing what the possible outcome can be. The resulting problems are people being severly injured, ceilings and/or roofs collapsing and fatalities. All of this can be avoided if these SAFETY WARNING SIGNS were enforced as a building code.

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

R602.3-RB-STDENIS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The adding of warning signs may not prevent cutting into load bearing walls. The signs are hidden within the wall cavity and may never be seen prior to cutting into the wall.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment:

Dennis St Denis, D&L Quality Homes, representing self, Guy Bourdeau, representing self, E. Hillfrich, Hilfrich, Inc, Lanielle St Denis, representing self, request Approval as Submitted.

Commenter's Reason:

(**D. St Denis):** I am asking the committee to reconsider their decision and approve my code change AS SUBMITTED. The opponent's arguments in my opinion were non-valid. Some of the arguments were, size and lettering on the signs, people not being able to read English, stamps on roof truss, renovators/people cutting into walls. These arguments do not compare to structure being compromised, sever injuries and death. Through research, I have proof of injuries, fatalities and structural compromise. The opponents provided no proof to back their arguments.

Opponents arguments.

Size and lettering on signs: Load Bearing Warning Signs are currently on the market, in production in Canada and soon The United States. Therefore size and lettering would be consistent.

People not being able to read English: English is the official language in the USA and the signs are available in bilingual. Therefore this argument is non-valid.

Stamps on roof trust: This is not related to this code change.

People cutting into walls: I have over 30 years in construction and have yet to see someone grab a saw and cut into a wall. People also do think of electrical wires and plumbing inside walls before cutting into them. The electrical code alone states that wall plugs must be a certain distance from one another. This puts electrical plugs on every wall. People who see this will not attempt to cut through a wall, its common sense. Removing the outer/finish layer is the preferred and most widely used way in home renovations.

I have submitted proof with my code change that there is a drastic need for warning signs on load bearing structure. This matter needs to be addressed as soon as possible. How many other people must get injured? How many other people must loose there life before something is done? The committee should stand by their commitment and make the right decision in ensuring public safety in the built environment.

I have also submitted along with this public comment form, more proof from the Ministry of Labour (Federal Government of Canada) showing injuries reported from walls collapsing due to removing structure. The search was done from 2006 until 2011 with 9 reports during this short time. You cannot get any more clear proof then this. No matter what country I search in, what state or province, there is proof showing that warning signs on load bearing walls is needed in the building code. The committee should stand behind building safety month, promoting safety in the built environment as stated on the website.

(Bourdeau): I wish the council would change its position and approve the code change as proposed. The industry spoke against the code change giving reasons such as; home owners not being able to read or understand the signs, building inspectors not being able to enforce the change, people not tearing the wall apart but cutting the wall down.

All these reasons can be accepted at face value but the opposite can also be argued to the effect that some people can read, building inspectors have to check the site after the framing is done at which point the signs would be on, and most people do not cut walls down as there are wires and plumbing hidden inside the walls. So the industries arguments are shallow.

Please do not forget that the purpose of the council is to create a code that protects the residential homeowner. This can be achieved by creating standards and tables that insures a construction is up to par. The council can also use another level of protection as does the electrical industry, plumbing industry and the department of highways. That level of protection is the use of warning signs.

Using the arguments of the building industry and applying them to the electrical industry would read as follows, do not put no entry warning signs on electric fencing around electric substations because people cannot read those signs, because it is not enforceable by the inspectors.

Using the arguments of the building industry, and applying them to the department of highway, would mean taking out warning signs of upcoming curves, of falling rocks and other such signs because people cannot read them or understand what they mean.

As a homeowner and past contractor/renovator, load bearing warning signs would have made my job easier and would have saved from damage to property in several instances. I would like to recall to the council's attention the death of employees in Bangladesh who were crushed under the collapse of their building. I would also like to recall the collapse of the mall in Northern Ontario which killed two people. I would also like to draw your attention to the proponent's research which submits twelve or more incidents in the residential sector of collapse, injury and death.

I therefore expect that the council will consider the proponent's submission with a positive outcome.

(Hilfrich): This proposal will go a long way to reducing the risks of damage to or removal of loadbearing wall elements during renovation work by untrained persons and thereby increase the safety and longevity of these structures. Too often, individual homeowners, or unskilled or poorly trained contractors remove or damage loadbearing elements of a structure without providing any replacement structural members. Inclusion of the small warning signage will significantly reduce these type of situations from going unnoticed and uncorrected.

(L. St Denis): I am asking the council to change its position and approve the code change as proposed. This is a growing problem, as many people are being killed and seriously injured when it comes to construction and renovation of homes. A list of such injuries and deaths has been submitted by the proponent . The issues that were addressed at the public hearing held in Texas by the community are issues that all building code proposals face when created and altered. There are some contractors that are illiterate and/or from other dialects that may not be able to read the signs, but the sign can be altered to suit. The same issues can be said when reading the book of building codes, however you have overcome that issue. There may be some confusion as to where the signs may be exposed, such as not being in the appropriate places, but I'm sure the inspectors that need to locate these signs will know where they should be and this will give them the opportunity to educate the contractors that get it wrong, as to what a load bearing wall is. There was also the issue of how contractors remove walls to obtain the open concept. Some take the drywall off, while others cut into the walls in the place they wish to open. Regardless of the method of removal, the signs will still be visible as they need to be placed 5 feet from the floor, which is almost at eye level and on every second stud. If a cutting tool is used, when they encounter the sign, it will be more difficult to cut through and this will prompt them to take a look and see the sign.

The loss of life and serious injuries caused by load points being removed without the proper education is a subject that the building code association needs to keep in mind when making the decision of accepting or rejecting this proposal. The purpose of your existence is to prevent death and injury and this proposal is exactly what you need to do so. This is a growing problem that not only entails do it yourselfers that don't know what they're doing, but also scab/immoral contractors that do everything they can to save a dollar. These people don't have the desire they need to do things right and the committee is there to push them to change. This building code proposal is exactly what you need to accomplish this goal.

RB270-13

Final Action: AS AM AMPC____ D

RB277-13
Table R602.3(1), Table R703.4

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.3(1)
FASTNER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS
32	Water-repellent siding (weighing less than 11 psf) attachment to Wood Structural Panel sheathing, either direct or over foam insulation [k]	Ring shank nail (0.148" min. dia.)	12” o.c. (per 12” of siding width)[l]
		Smooth or screw shank nail (0.148" min. dia.)	3” o.c. (per 12” of siding width)[l]
		Vinyl siding nail (0.120" min. dia.)	3” o.c. (per 12” of siding width)[l]
		#6 screw (0.138" min. dia.)	12” o.c. (per 12” of siding width)[l]
		#8 screw (0.164" min. dia.)	16” o.c. (per 12” of siding width)[l]

(Portions of table not shown remain unchanged)

k. Fastener length shall be sufficient to penetrate back side of the minimum 7/16" WSP sheathing by at least ¼”.
l. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners

(Portions of Table not shown remain unchanged)

d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer’s installation instructions or Table R602.3(1).

Reason:
1. With the elimination of the term “nailable sheathing” in Chapter 7 last cycle, users of Table R703.4 are left without guidance on how to attach siding products to wood structural panel sheathing alone. Additionally, the trend toward the use of non-structural foam sheathing over structural sheathing has led to the development of the proposal for Item 32 above. It provides attachment recommendations for any siding products with an applied weight of less than 11 psf direct to wood structural panel sheathing or through any thicknesses of foam sheathing without having to penetrate the wall framing. This can be essential when attaching siding through thicker foam insulation panels as actually finding the framing with fasteners can be a challenge.

Footnote k requires the fastener used to penetrate the wood structural panel sheathing back side by at least ¼ inch. This will ensure that the cylindrical shank of the fastener is engaged in the wood structural panel, providing the maximum withdrawal capacity. This also provides the user with the maximum flexibility when selecting fasteners. For example, when attaching vinyl siding over 2 inches of foam sheathing into 7/16-inch wood structural panel sheathing, the fastener can be any length greater than

(1/8" + 2" + 7/16" + ¼"=) 2-13/16 inches, so a 3-inch long nail should work. For a smooth shank nail, a 10d Common nail (3" x 0.148") meets both the length and diameter requirements. If 1 inch of penetration was required in the stud, a nail of (1/8" + 2" + 7/16" + 1"=) 3-9/16 inches would be required. As such, 20d box nail (4" x 0.148") or some specialty nail would be required.

Footnote l provides the methodology for adjusting the fastener spacing to accommodate lap siding greater or less than 12 inches in width. The adjustment calls for 12" to be divided by the siding width. The fastener spacing provided for in Item 32 is then multiplied by this factor.

The above proposal is based on ASCE 7-10 V_{ult}, <140 miles per hour, maximum 30 ft building height, Exposure C or less.

The table was developed based on the principle of engineering mechanics and confirmed by full-scale wind tunnel tests at the Insurance Institute for Business & Home Safety (IBHS) Research Center in Chester County, South Carolina. The wind tunnel test report is available at http://www.apawood.org/TechnicalPapers/IBHS_WindTunnelTestReport.pdf or by contacting the APA help desk at help@apawood.org.

2. Footnote d to Table R703.4 was changes to add proposed item 32 to the list of information sources available for nailing direct to wood structural panel sheathing.

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

R602.3(1)T-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is an undefined term "water-repellant siding". The 3" o.c. nail of vertical vinyl siding is impractical.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.3(1)
FASTNER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS
32	~~Water-repellent siding~~ Exterior wall covering (weighing less than 11 psf) attachment to ~~Wood Structural Panel~~ wood structural panel sheathing, either direct or over foam ~~insulation~~ sheathing a maximum of 2 inches thick.[k]	Ring shank roofing nail (0.120" min. dia.)	12" o.c. (per 12" of siding width)[l]
		Ring shank nail (0.148" min. dia.)	~~12"~~ 15" o.c. (per 12" of siding width)[l]
		~~Smooth or screw shank nail (0.148" min. dia.)~~	~~3" o.c. (per 12" of siding width)[l]~~
		~~Vinyl siding nail (0.120" min. dia.)~~	~~3" o.c. (per 12" of siding width)[l]~~
		#6 screw (0.138" min. dia.)	12" o.c. (per 12" of siding width)[l]
		#8 screw (0.164" min. dia.)	16" o.c. (per 12" of siding width)[l]

k. Fastener length shall be sufficient to penetrate back side of the ~~minimum 7/16"~~ wood structural panel sheathing by at least 1/4". The wood structural panel sheathing shall be 7/16" or thicker in thickness.

l. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

(Portions of table/footnotes not shown remain unchanged)

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacture's installation instructions or Table R602.3(1).

(Portions of table/footnotes not shown remain unchanged)

Commenter's Reason: APA attempted to work with other industries while developing this code change proposal. There was, however, not sufficient time to fully resolve some of the outstanding issues with the Vinyl Siding Institute (VSI) in December 2012. This PC reflects the resolution between APA and the VSI. We also took this opportunity to make some adjustments to the original proposal that we were unable to make through the Floor Modification procedure.

Additional proposal adjustments –

1. Recent research conducted by the foam industry suggests that limiting the thickness of the foam sheathing to 2 inches or less will minimize the potential for long term sagging of the siding material. With thicker foam sheathing, the fasteners used to attach the foam are essentially cantilevered through the foam away from the main member of the connection. For smaller diameter fasteners, the cantilevered fasteners can bend over time causing the water-resistant barrier to sag downward. Even though the use of the wall sheathing alone to anchor the siding requires a closer fastener spacing than that tested by the foam industry and should result in greater resistance to long term sagging of the siding, we have chosen to be conservative in our proposal to ensure good performance of the siding and its attachment to the wood structural panel sheathing.
2. We also changed the term "foam insulation" to "foam sheathing" to be consistent with the code definition.
3. We changed "Water repellent siding" to "Exterior wall covering" as it seemed more clearly described as such.
4. Footnote K was rewritten separating the requirements of the footnote into two separate sentences to ensure correct interpretation of the provisions. The requirements are:
    a. Full penetration of the wood structural panel sheathing by at least ¼ inch to ensure that the pyramidal tip of the fastener is not considered in the "depth of penetration" of the fastener, as the tip contributes nothing to the withdrawal capacity of the fastener. We want the nail to penetrate the wood structural panel sheathing, *regardless of thickness* to provide a visual indication of the nails' presence, adequate length and penetration of the wood structural panel sheathing.
    b. The second separate requirement is the minimum thickness of the wood structural panel sheathing. The tables are based on the use of 7/16" minimum thickness sheathing.
5. Two entries were eliminated as the unadjusted spacing of 3" on center was deemed to be far less useful than the deformed-shank fastener information provided.
6. The ring-shank roofing nail was added to the table as they have been used in part of the country.

RB277-13

Final Action: AS AM AMPC____ D

RB278-13
Table R602.3(1)

Proposed Change as Submitted

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

Revise as follows:

Table R602.3(1)
FASTENING SCHEDULE ~~FOR STRUCTURAL MEMBERS~~

~~ITEM~~	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER [a, b, c]	SPACING AND LOCATION ~~OF FASTENERS~~
	Roof		
1	Blocking between ceiling joists or rafters to top plate~~, toe nail~~	3-8d (2 ½ " x 0.113")	at each end, toe nail
2	Ceiling joists to top plate~~, toe nail~~	3-8d (2 ½ " x 0.113")	per joist, toe nail
3	Ceiling joist not attached to parallel rafter laps over partitions~~, face nail~~ (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	3-10d (3" x 0.128")	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	Per Table R802.5.1(9)	Face nail
~~4~~5	Collar tie to rafter, ~~face nail~~ or 1 1/4" x 20 gage ridge strap to rafter	3-10d (3" x 0.128")	Face nail
~~5~~6	Rafter or roof truss to plate~~, toe nail~~	3-16d box nails (3 ½" x 0.135"); or 3-10d common nails (3" x 0.148")	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss [j]
~~6~~7	Roof rafters to ridge, valley or hip rafters: or, roof rafter to minimum 2-inch ridge beam ~~toe nail face nail~~	4-16d (3 ½ " x 0.135") 3-16d (3 ½ " x 0.135")	Toe nail End nail
	Wall		
~~7~~8	~~Built-up studs—face nail~~ Stud to stud (not at braced wall panels)	10d (3" x 0.128")	24" o.c. face nail
~~8~~9	~~Abutting studs at intersecting wall corners, face nail~~ Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d (3 ½ " x 0.135")	12" o.c. face nail
~~9~~10	~~Built-up header, two pieces with 1/2" spacer~~ Built-up header (2-inch to 2-inch header)	16d (3 1/2" × 0.135")	16" o.c. ~~along~~ each edge face nail
~~10~~	~~Continued header, two pieces~~	~~16d (3 1/2" × 0.135")~~	~~16" o.c. along each edge~~
11	Continuous header to stud~~, toe nail~~	4-8d (2 ½ " × 0.113")	Toe nail
~~12~~	~~Double studs, face nail~~	~~10d (3" × 0.128")~~	~~24" o.c.~~
~~13~~12	~~Double top plates, face nail~~ Top plate to top plate	10d (3" × 0.128")	24" o.c. face nail
~~14~~13	~~Double top plates, minimum 24-inch offset of end joints, face nail in lapped area~~ Top plate to top plate, at end joints	8-16d (3 ½ " × 0.135")	Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)
~~15~~14	~~Sole plate to joist or blocking, face nail~~ Bottom plate to joist, rim joist, band	16d (3 ½ " × 0.135")	16" o.c. face nail

	joist or blocking (not at braced wall panels)		
~~16~~15	~~Sole plate to joist or blocking at braced wall panels~~ Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d (3 1/2" × 0.135")	16" o.c. face nail
~~17~~16	Stud to ~~sole~~ bottom plate~~, toe nail~~	3-8d (2 1/2" × 0.113") or 2-16d (3 1/2" × 0.135")	Toe nail End nail
~~18~~17	Top or ~~sole~~ bottom plate to stud~~, end nail~~	2-16d (3 1/2" × 0.135")	End nail
~~19~~18	Top plates, laps at corners and intersections~~, face nail~~	2-10d (3" × 0.128")	Face nail
~~20~~19	1" brace to each stud and plate~~, face nail~~	2-8d (2 1/2" × 0.113") 2 staples 1 3/4"	Face nail --
~~21~~20	1" × 6" sheathing to each bearing~~, face nail~~	2-8d (2 1/2" × 0.113") 2 staples, 1" crown, 16 ga., 1 3/4" long	Face nail --
~~22~~	~~1" × 8" sheathing to each bearing, face nail~~	~~2-8d (2 1/2" × 0.113")~~ ~~3 staples 1 3/4"~~	~~--~~ ~~--~~
~~23~~21	~~Wider than 1" × 8" sheathing to each bearing, face nail~~ 1" x 8" and wider sheathing to each bearing	1"x 8": 2-8d (2 1/2" × 0.113") 3 staples, 1" crown, 16 ga., 1 3/4" long Wider than 1"x 8": 3-8d (2 1/2" × 0.113") 4 staples, 1" crown, 16 ga., 1 3/4" long	Face nail --
	Floor		
~~24~~22	Joist to sill, top plate, or girder~~, toe nail~~	3-8d (2 1/2" × 0.113")	Toe nail
~~25~~23	~~Rim joist to top plate, toe nail (roof applications also)~~Rim joist, band joist, or blocking to sill or top plate (roof application also)	8d (2 1/2" × 0.113")	6" o.c. toe nail
~~26~~	~~Rim joist or blocking to sill plate, toe nail~~	~~8d (2 ½" × 0.113")~~	~~6" o.c.~~
~~27~~24	1" × 6" subfloor or less to each joist~~, face nail~~	2-8d (2 1/2" × 0.113") 2 staples, 1" crown, 16 ga., 1 3/4" long	Face nail
~~28~~25	2" subfloor to joist or girder~~, blind and face nail~~	2-16d (3 1/2" × 0.135")	Blind and face nail
~~29~~26	2" planks (plank & beam - floor & roof)	2-16d (3 1/2" × 0.135")	at each bearing, face nail
~~30~~27	Built-up girders and beams, 2-inch lumber layers	10d (3" × 0.128")	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.
~~31~~28	Ledger strip supporting joists or rafters	3-16d (3 1/2" × 0.135")	At each joist or rafter, face nail
29	Joist to band joist or rim joist	4-10d (3" x 0.128")	End nail
30	Bridging to joist	2-10d (3" x 0.128")	Each end, toenail

ITEM	DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER[b,c,e]	SPACING OF FASTENERS	
			Edges (inches)[i]	Intermediate supports[c,e] (inches)
	Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing			
~~32~~31	3/8" - 1/2"	6d common (2" × 0.113") nail (subfloor	6	12[g]

		wall)[j] 8d common (2 1/2" × 0.131") nail (roof)[f]		
~~33~~32 ~~34~~33	19/32" - 1" 1 1/8" - 1 1/4"	8d common nail (2 1/2" × 0.131") 10d common (3" × 0.148") nail; or 8d (2 1/2" × 0.131") deformed nail	6 6	12[g] 12
Other wall sheathing [h]				
~~35~~34	1/2" structural cellulosic fiberboard sheathing	1 1/2" galvanized roofing nail, 7/16" ~~crown or~~ head diameter, or 1" crown staple 16 ga., 1 1/4" long	3	6
~~36~~35	25/32" structural cellulosic fiberboard sheathing	1 3/4" galvanized roofing nail, 7/16" ~~crown~~ head diameter, or 1" crown staple 16 ga., 1 1/2" long	3	6
~~37~~36	1/2" gypsum sheathing [d]	1 1/2" galvanized roofing nail; staple galvanized, 1 1/2" long; 1 1/4 screws, Type W or S	7	7
~~38~~37	5/8" gypsum sheathing [d]	1 3/4" galvanized roofing nail; staple galvanized, 1 5/8" long; 1 5/8" screws, Type W or S	7	7
Wood structural panels, combination subfloor underlayment to framing				
~~39~~38	3/4" and less	6d deformed (2" × 0.120") nail; or 8d common (2 1/2" × 0.131") nail	6	12
~~40~~39	7/8" - 1"	8d common (2 1/2" × 0.131") nail; or 8d deformed (2 1/2" × 0.120") nail	6	12
~~41~~40	1 1/8" - 1 1/4"	10d common (3" × 0.148") nail; or 8d deformed (2 1/2" × 0.120") nail	6	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 Ksi = 6.895 MPa.

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.

b. Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. For regions having basic wind speed of 110 mph or greater, 8d deformed (21/2" × 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.

g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

h. Gypsum sheathing shall conform to ASTM C 1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C 208.

i. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

j. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

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

This proposed change is the second part of an effort by the ICC Building Code Action Committee to create a consistent format for the conventional wood frame fastener schedules in the IBC and the IRC. The revised descriptions in this proposed change were approved in the corresponding Table 2304.9.1 of the IBC (see S265). The row descriptions and organization of the IBC table (and now proposed in this IRC table) will be substantially the same, allowing for ease of use.

Complete consistency between the actual fastening specified in the two codes was beyond the scope of the committee work. In the approved IBC table some changes were made in order to provide alternatives currently permitted in the IRC, and to establish some common nail equivalents. No substantial changes are proposed to the IRC fastening, since the existing table generally permits the substitution of box nails for common nails, and the current fastening is well established. Rather, changes have been limited to the ordering, modification, addition, or combining of the fastening descriptions for clarity and consistency.

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

R602.3(1)-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee feels this does not add clarity. The committee prefers RB272-13.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, and Dennis Pitts, American Wood Council request Approval as Submitted.

Commenter's Reason:

(Bajnai): The ICC Building Code Action Committee (BCAC) request that the code development committee be overturned and this proposal be *approved as submitted.*

Confusion during testimony at the hearings inferred that RB278 was in conflict with RB272. The BCAC worked with AWC to be sure they are completely compatible.

1. This is the second half of a two part code change to reformat the prescriptive fastener schedule in the IRC with IBC, Table 2304.9.1. The first half was approved in the last cycle (S265-12) in Portland.

2. RB272-13, submitted by the American Wood Council, primarily makes adjustments to the actual fastenings specified (number and size of nails) in order to increase flexibility of options and also to establish baseline capacities for all the connections, when comparing the codes.

3. Approval of both RB278 and RB272 will result in a uniform table format, as well as more uniform fastener specifications, between the two codes. Merging the two proposals will not be difficult since one adjusts the descriptions, and the other the specified fastening.

(Pitts): We support the formatting revisions put forward by the BCAC in RB278 and consider them compatible with RB272. This change revises descriptions of some entries to be consistent with what was approved for the prescriptive fastener schedule in the IBC (see S265-12). With RB272 and RB278 both approved, the final table would appear as follows:

Table R602.3(1)
FASTENING SCHEDULE

	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER [a, b, c]	SPACING AND LOCATION
		Roof	
1	Blocking between ceiling joists or rafters to top plate	4-8d box (2.5 " x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	at each end, toe nail
2	Ceiling joists to top plate	4-8d box (2.5 " x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	per joist, toe nail
3	Ceiling joist not attached to parallel rafter laps over partitions (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	4-10d box (3"x 0.128"); or 3-16d common (3.5" x 0.162"); or 4-3" x 0.131" nails	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2,	Per Table R802.5.1(9)	Face nail

	Table R802.5.1(9))		
5	Collar tie to rafter, or 1 1/4” x 20 gage ridge strap to rafter	4 -10d box (3”x 0.128”); or 3-10d common (3" x 0.148"); or 4-3” x 0.131” nails	Face nail
6	Rafter or roof truss to plate	3-16d box nails (3.5” x 0.135”); or 3-10d common nails (3” x 0.148”); or 4-10d box (3" x 0.128"); or 4-3” x 0.131 nails	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss [j]
7	Roof rafters to ridge, valley or hip rafters; or, roof rafter to minimum 2-inch ridge beam	4-16d box (3.5 ” x 0.135”); or 3-10d common (3.5” x 0.148”); or 4-10d box (3" x 0.128"); or 4-3” x 0.131” nails 3-16d box (3.5 ” x 0.135”) 2-16d common (3.5” x 0.162”); or 3-10d box (3" x 0.128"); or 3-3” x 0.131” nails	Toe nail End nail
Wall			
8	Stud to stud (not at braced wall panels)	16d common (3.5” x 0.162”) 10d box (3" x 0.128"); or 3” x 0.131” nails	24” o.c. face nail 16” o.c.
9	Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d box (3.5 ” x 0.135”); or 3” x 0.131” nails 16d common (3.5” x 0.162”)	12” o.c. face nail 16” o.c.
10	Built-up header (2-inch to 2-inch header)	16d common (3.5" x 0.162") 16d box (3.5” x 0.135”)	16" o.c. each edge face nail 12” o.c. along each edge
11	Continuous header to stud	5-8d box (2.5 ″ × 0.113″); or 4-8d common (2.5" x 0.131"); or 4-10d box (3" x 0.128")	Toe nail
12	Top plate to top plate	16d common (3.5" x 0.162") 10d box (3" x 0.128"); or 3” x 0.131” nails	16" o.c. face nail 12” o.c.
13	Top plate to top plate, at end joints	8-16d common (3.5" x 0.162"); or 12-16d box (3.5" x 0.135"); or 12-10d box (3" x 0.128"); or 12-3” x 0.131” nails	Face nail on each side of end joint (minimum 24” lap splice length each side of end joint)
14	Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)	16d common (3.5" x 0.162") 16d box (3.5" x 0.135"); or 3” x 0.131” nails	16" o.c. face nail 12” o.c.
15	Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162"); or 4-3” x 0.131” nails	16" o.c. face nail
16	Stud to bottom plate	4-8d box (2.5″ × 0.113″);or 3-16d box (3.5″ × 0.135″); or 4-8d common (2.5" x 0.131"); or 4-10d box (3" x 0.128"); or 4-3” x 0.131” nails	Toe nail End nail
17	Top or bottom plate to stud	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3” x 0.131” nails	End nail
18	Top plates, laps at corners and intersections	3-10d box (3″ × 0.128″); or 2-16d common (3.5" x 0.162"); or 3-3" x 0.131" nails	Face nail
19	1" brace to each stud and plate	3-8d box (2.5″ × 0.113″); or 2-8d common (2.5" x 0.131"); or 2-10d box (3" x 0.128") 2 staples 1.75″	Face nail
20	1" × 6" sheathing to each bearing	3-8d box (2.5″ × 0.113″); or 2-8d common (2.5" x 0.131"); or 2-10d box (3" x 0.128") 2 staples, 1” crown, 16 ga., 1.75″ long	Face nail

21	1” x 8” and wider sheathing to each bearing	1”x 8”: 3-8d box (2.5″ × 0.113″); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 3 staples, 1” crown, 16 ga., 13/4″ long Wider than 1”x 8”: 4-8d box (2.5″ × 0.113″); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 4 staples, 1” crown, 16 ga., 1.75" long	Face nail	
Floor				
22	Joist to sill, top plate, or girder	4-8d box (2.5″ × 0.113″); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Toe nail	
23	Rim joist, band joist, or blocking to sill or top plate (roof application also)	8d box (2.5″ × 0.113″) 8d common (2.5" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails	4” o.c. toe nail 6" o.c.	
24	1" × 6" subfloor or less to each joist	3-8d box (2.5″ × 0.113″); or 2-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 2 staples, 1” crown, 16 ga., 1.75″ long	Face nail	
25	2" subfloor to joist or girder	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162")	Blind and face nail	
26	2" planks (plank & beam - floor & roof)	3-16d box (3.5″ × 0.135″); or 2-16d common (3.5" x 0.162")	at each bearing, face nail	
27	Built-up girders and beams, 2-inch lumber layers	20d common (4” x 0.192”); or 10d box (3" x 0.128"); or 3" x 0.131" nails And: 2-20d common (4” x 0.192”); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Nail each layer as follows: 32″ o.c. at top and bottom and staggered. 24” o.c. face nail at top and bottom staggered on opposite sides Face nail at ends and at each splice	
28	Ledger strip supporting joists or rafters	4-16d box (3.5″ × 0.135″); or 3-16d common (3.5" x 0.162"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	At each joist or rafter, face nail	
29	Joist to band joist or rim joist	4-10d (3" x 0.128")	End nail	
30	Bridging to joist	2-10d (3" x 0.128")	Each end, toenail	
	DESCRIPTION OF BUILDING MATERIALS	**DESCRIPTION OF FASTENER[b,c,e]**	**SPACING OF FASTENERS**	
			Edges (inches)[i]	**Intermediate supports[c,e] (inches)**
Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing				
31	3/8" - 1/2"	6d common (2" × 0.113") nail (subfloor wall)[j] 8d common (2.5" × 0.131") nail (roof)[f]	6	12[g]
32	19/32" - 1"	8d common nail (2.5" × 0.131")	6	12[g]
33	11/8" - 11/4"	10d common (3" × 0.148") nail; or 8d (2.5" × 0.131") deformed nail	6	12
Other wall sheathing [h]				
34	1/2" structural cellulosic fiberboard sheathing	1.5" galvanized roofing nail, 7/16" head diameter, or 1" crown staple 16 ga., 11/4" long	3	6
35	25/32" structural cellulosic fiberboard sheathing	1.75" galvanized roofing nail, 7/16" head diameter, or 1" crown staple 16 ga., 11/2" long	3	6
36	1/2" gypsum sheathing [d]	1.5" galvanized roofing nail; staple	7	7

		galvanized, 11/2" long; 11/4 screws, Type W or S		
37	5/8" gypsum sheathing [d]	1.75" galvanized roofing nail; staple galvanized, 15/8" long; 15/8" screws, Type W or S	7	7
Wood structural panels, combination subfloor underlayment to framing				
38	3/4" and less	6d deformed (2" × 0.120") nail; or 8d common (2.5" × 0.131") nail	6	12
39	7/8" - 1"	8d common (2.5" × 0.131") nail; or 8d deformed (2.5" × 0.120") nail	6	12
40	11/8" - 11/4"	10d common (3" × 0.148") nail; or 8d deformed (2.5" × 0.120") nail	6	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 Ksi = 6.895 MPa.

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.
b. Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.
c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.
d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.
e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).
f. For regions having basic wind speed of 110 mph or greater, 8d deformed (21/2" × 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.
g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.
h. Gypsum sheathing shall conform to ASTM C 1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C 208.
i. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.
j. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

The above final table reflects the following:

RB278 deleted current row 10, whereas RB 272 modified the fastenings—deletion of current row 10 was assumed to be the final result.

RB278 deleted current row 12, whereas RB 272 modified the fastenings—deletion of current row 12 was assumed to be the final result.

RB278 deleted current row 22, whereas RB 272 modified the fastenings—deletion of current row 22 was assumed to be the final result.

RB278 deleted current row 26, whereas RB 272 modified the fastenings—deletion of current row 26 was assumed to be the final result.

The deleted rows contained descriptions that were combined into other rows by virtue of the reformatting in RB278, so the deleted rows fastenings are contained in other rows of the proposed table and nothing is lost.

Public Comment 2:

Randall Shackelford, Simpson Strong-Tie Company, requests Approval as Modified by this Public Comment.

Table R602.3(1)
FASTENING SCHEDULE

	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER [a, b, c]	SPACING AND LOCATION
	Roof		
1	Blocking between ceiling joists or rafters to top plate	3-8d (2 ½ " x 0.113")	~~at each end~~ toe nail
2	Ceiling joists to top plate	3-8d (2 ½ " x 0.113")	per joist, toe nail
3	Ceiling joist not attached to parallel rafter laps over partitions~~-~~(see Section R802.3.1, R802.3.2, Table R802.5.1(9))	3-10d (3" x 0.128")	Face nail
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	Per Table R802.5.1(9)	Face nail
5	Collar tie to rafter, or 1 1/4" x 20 gage ridge strap to rafter	3-10d (3" x 0.128")	Face nail each rafter
6	Rafter or roof truss to plate	3-16d box nails (3 ½" x 0.135"); or 3-10d common nails (3" x 0.148")	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss [j]
7	Roof rafters to ridge, valley or hip rafters: or, roof rafter to minimum 2-inch ridge beam	4-16d (3 ½ " x 0.135") 3-16d (3 ½ " x 0.135")	Toe nail End nail
	Wall		
8	Stud to stud (not at braced wall panels)	10d (3" x 0.128")	24" o.c. face nail
9	Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d (3 ½ " x 0.135")	12" o.c. face nail
10	Built-up header (2-inch to 2-inch header with ½" spacer)	16d (3 ½" × 0.135")	16" o.c. along each edge, face nail
11	Continuous header to stud	4-8d (2 ½ " × 0.113")	Toe nail
12	Top plate to top plate	10d (3" × 0.128")	24" o.c. face nail
13	Top plate to top plate, at end joints	8-16d (3 ½ " × 0.135")	Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)
14	Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)	16d (3 ½ " × 0.135")	16" o.c. face nail
15	Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d (31/2" × 0.135")	3 each 16", face nail
16	Stud to bottom plate	3-8d (21/2" × 0.113") or 2-16d (31/2" × 0.135")	Toe nail End nail
17	Top ~~or bottom~~ plate to stud	2-16d (31/2" × 0.135")	End nail
18	Top plates, laps at corners and intersections	2-10d (3" × 0.128")	Face nail
19	1" brace to each stud and plate	2-8d (21/2" × 0.113") 2 staples 13/4"	Face nail --
20	1" × 6" sheathing to each bearing	2-8d (21/2" × 0.113") 2 staples, 1" crown, 16 ga., 13/4"long	Face nail --
21	1" x 8" and wider sheathing to each bearing	1"x 8": 2-8d (21/2" × 0.113") 3 staples, 1" crown, 16 ga., 13/4" long Wider than 1"x 8": 3-8d (21/2" × 0.113") 4 staples, 1" crown, 16 ga., 13/4" long	Face nail --
	Floor		

Commenter's Reason: We support the BCAC's reorganization of this table for consistency with the IBC's fastening for Conventional Construction. There are just a few items that we think can be improved.

- Line 1, for blocking between roof members, the toe nails are to the top plate along the length of the blocking, not at each end into the ceiling joist or rafter. The purpose of the blocking is to transfer shear forces into the top plate, and the toenailing has to be into the top plate to do this.
- Line 5, the fastening of the collar tie or ridge strap has to be into *each* rafter, not just a total of three nails.
- Line 10, the fastening of the built-up header uses 16d 3-1/2" long nails, so the minimum thickness of the built-up header must be 3-1/2". Therefore there must be a spacer, so we propose restoring the words "with ½" spacer".
- Line 10, the nails are installed "along" each edge, so we propose restoring that word to the fastener location.
- Line 15, the fastening at braced wall panels requires that three 16d nails be installed every 16". We propose adding "3 each" to remove the possibility for interpreting this as requiring only one nail every 16" o.c.
- Line 17, the fastening of stud to bottom plate is already covered in the previous line, so it can be deleted here.

RB278-13

Final Action: AS AM AMPC____ D

RB281-13
Table R602.3(5)

Proposed Change as Submitted

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association

Revise as follows:

TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS[a]

a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where ~~justified by analysis~~ in compliance with exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.

(Portions of Table not shown remain unchanged)

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

The BCAC discussed what was inferred by "…where justified by analysis." meant. The conclusion was that this footnote should say that stud wall can be increased above 10 feet when the wall is compliant with exception 2 of Section R602.3.1 – in which case an engineered solution is not required.

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

R602.3(5)-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This change removes ambiguous language and adds clarity to the footnote.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS[a]

a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Bearing walls shall be sheathed on at least one side or bridging shall be installed not greater than 4 feet apart measured vertically from either end of the stud. Increases in unsupported height are permitted where in compliance with exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.

(Portions of Table not shown remain unchanged)

Commenter's Reason: This proposal was ***approved as submitted***. The ICC Building Code Action committee (BCAC) submits this public comment address an omission.

The stud table, Table R602.3(5), assumes there is gypsum wall board or sheathing applied to at least one side of the studs to stabilize weak axis bending. It came to our attention that this is not explicit in the other sections of the code, though it is implied. This further modification addresses the possible omission. Without wall finish on at least one side, the studs would not be within the L / d limit required by the AWC/AF&PA NDS and the buckling capacity of the studs in the weak direction could be exceeded.

RB281-13

Final Action: AS AM AMPC____ D

RB282-13
Table R602.3.1

<u>Proposed Change as Submitted</u>

Proponent: James Bela, Oregon Earthquake Awarenes

Revise as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100 MPH OR LESS
IN SEISMIC DESIGN CATEGORIES A, B, C $^{\underline{b,c}}$, D_0 $^{\underline{b,c}}$, D_1 $^{\underline{b,c}}$, and D_2^{b,c}

c. <u>Dimension Lumber grades for wood wall studs shall be minimum Construction grade lumber.</u> Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

(Portions of Table not shown remain unchanged)

Reason: (a) Wood is an orthotropic material; and it therefore exhibits "unique and independent material properties" in 3 different orthogonal directions. Trees, unfortunately, also produce naturally occurring but "strength reducing characteristics" in sawn lumber: such as knots, shakes, and splits. Therefore wall studs at the MAXIMUM ALLOWABLE LENGTH limits will have their performances, in actuality, determined by this combination or mixture of "clear wood and strength reducing characteristics."
[http://bssc.nibs.org/client/assets/files/bssc/Topic13-SeismicDesignofWoodStructuresNotes.pdf]

(b) All of the SEISMIC DESIGN CATEGORIES (C, D_0, D_1 and D_2) are at risk to experience damaging intensities of earthquake shaking; and they are not, as too often is incorrectly assumed, *guarantees* of "low - to moderate - to high" earthquake loading (comparable to other external loadings that one might anticipate and design for – such as snow load.
See IRC-14-3_FIG. R301.2(2) SEISMIC DESIGN CATEGORIES SITE CLASS D.doc for a full discussion on the systemic errors and fundamental flaws in designating SEISMIC DESIGN CATEGORIES under the USGS National Seismic Hazard Maps (as incorporated now into ASCE 7-10).

Since earthquake damage results from multiple factors: Strength of shaking, Length of shaking, Type of soil, Type of building materials, and Type of building "lateral force resisting system" – WOOD WALL STUDS should exhibit the same lumber grade.

See Buildings and earthquakes—Which stands? Which falls?
http://www.iris.edu/hq/files/programs/education_and_outreach/retm/tm_100112_haiti/BuildingsInEQs_2.pdf

(c) Finally, since the lower SEISMIC DESIGN CATEGORIES downgrade the expected earthquake effects; they permit fewer lateral force resisting elements in walls (and also allow brittle elements (gypsum sheathing) rather than ductile elements (nailed wood shear walls: alternately referred to as "braced wall panels" in the IRC).

Summary: Above 10 ft in height, where we are beginning to push the limits of a "prescriptive code," WOOD WALL STUDS should all exhibit the same engineering properties of "minimum construction grade lumber" – in order to ensure both adequate and reasonable earthquake safety performance.

STUD *LIGHT* . . . is no match for earthquakes!

See Graphic: Damage to wood stud wall – 1994 Northridge EQ

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

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

R602.3.1T-RB-BELA.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This change does not clarify the code nor change the technical requirements.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jonathan Siu, City of Seattle, Dept of Planning & Development, representing FEMA/NIBS Code Resource Support Committee and City of Seattle DPD, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100 MPH OR LESS, IN ALL SEISMIC DESIGN CATEGORIES ~~A, B, C [b,c], D_0 [b,c], D_1 [b,c], and D_2~~ [b,c]

c. ~~Dimension Lumber grades for wood wall studs shall be minimum Construction grade lumber.~~ Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

Commenter's Reason: The proponent of the original code change has correctly identified a point of confusion as to the application of footnotes b and c to this table: do they apply just to Seismic Design Category (SDC) D2, or to other SDC's as well? While the proponent suggested applying them to SDC's C through D2, the Code Resource Support Committee (CRSC) came to the conclusion that the intent was the footnotes apply to all SDC's. The CRSC also came to the conclusion that allowing construction grade lumber in these walls was not appropriate, and the footnote should remain unchanged from the 2012 IRC. At the Committee Action Hearings, the CRSC proposed a modification to make these changes, but the Committee decided to disapprove the whole item.

Given the apparent confusion, the CRSC feels there is value in clarifying the code. The modifications proposed in this Public Comment are identical to the modification submitted at the Committee Action Hearings:

1. The table title is modified to delete the individual listing of Seismic Design Categories
2. Footnotes b and c now clearly apply to all Seismic Design Categories.

3. The originally proposed change to Footnote c is not adopted, resulting in the retention of the original 2012 IRC text.

RB282-13

Final Action: AS AM AMPC____ D

RB283-13
R602.3.1, Table R602.3.1

Proposed Change as Submitted

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

Revise as follows:

R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.
2. ~~Studs more than 10 feet in height which are in accordance with Table R602.3.1.~~
   Where snow loads do not exceed 25 pounds per square foot, walls exposed to wind loads of 100 mph or less shall be permitted over 12 feet tall for either supporting a roof load with not more than 6' of tributary length, or for a gable end wall. The studs shall be a minimum 2x6 at 16 inches on center with a maximum height of 18 feet or 2x6 at 12 inches on center with a maximum height of 20 feet. Openings shall be permitted with jack studs supporting the header in accordance with Section R602.7 and double king studs outboard of the jacks on each side of the opening. If any portion of the two-story wall is required to be a qualified braced wall panel to achieve compliance with Section R602.10.2 for either floor, then the wall shall be designed by a registered design professional in accordance with the International Building Code.

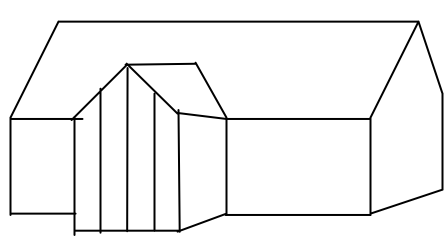
~~TABLE R602.3.1~~
~~MAXIMUM ALLOWABLE LENGTH OF WOOD STUDS EXPOSE TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C,~~ $\cancel{D_0}$, $\cancel{D_1}$, ~~and~~ $\cancel{D_2}$ ~~[b,c]~~

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

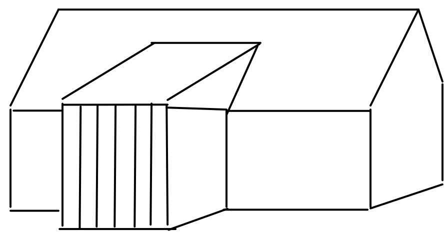
Table R602.3.1 has been the source of a lot of confusion. The footnote b is seldom read or understood. This change is submitted to:

1. Eliminate the table - the source of the confusion
2. Provide clarification as to where it can be applied (see the three options below)
3. Write in code language the requirements for when tall studs can be used.
4. To say that you cannot use these tall studs where the wall is an integral part of the wall bracing system.

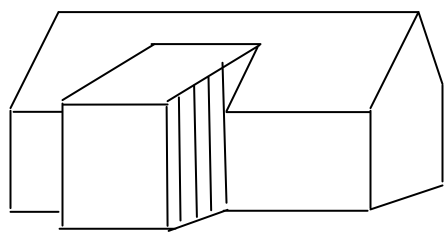
Tall studs could be used for two-story gable ended wall supporting nothing more than self weight.



Tall studs could be used for a two-story projection where the roof framing runs perpendicular to the wall so long as the overbuilt roof has a trib length of 6' or less



Tall studs could be used for a two-story projection where the roof framing runs parallel to the wall such that it was supporting nothing more than self weight



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

R602.3.1-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The reason is unclear and the revision will not add any clarity to the code provisions. This would remove the use of the prescriptive design in the WFCM and require an engineered design.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.
2. ~~Studs more than 10 feet in height which are in accordance with Table R602.3.1.~~ <u>Where snow loads are less than or equal to 25 pounds per square foot, and the ultimate design wind speed is less than or equal to 130 mph, 2x6 studs supporting a roof load with not more than 6' of tributary length shall have a maximum height of 18 feet where spaced</u>

at 16 inches on center, or 20 feet where spaced at 12 inches on center. Studs shall be minimum No. 2 grade lumber.

~~**TABLE R602.3.1**~~
~~**MAXIMUM ALLOWABLE LENGTH OF WOOD STUDS EXPOSE TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D_0, D_1, and D_2 [b,c]**~~

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committee's concerns.

1. The BCAC expressed in the original code change that the table could be more clearly understood in text rather than in table format. The code development committee disagreed. The BCAC has rewritten the text to make it even more clear.

2. This public comment removes reference to the IBC and engineered design so that design in accordance with WFCM is still permitted.

3. The reason the original code change proposal was written was because the footnote b to the table is frequently missed or applied incorrectly.
The basic stud table only allows studs to be 10 feet tall.
The exception in the wall bracing section will allow studs to be 12 feet tall.
Studs can go to 20 feet when the footnote b to Table R602.3.1 is applied, namely walls can carry a maximum of 6' of tributary width.

RB283-13
Final Action: AS AM AMPC____ D

RB284-13
R602.3.2

<u>Proposed Change as Submitted</u>

Proponent: Edward L. Keith, P.E., APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.3.2 Top plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches (610 mm). Joints in plates need not occur over studs. Plates shall be not less than 2-inches (51 mm) nominal thickness and have a width at least equal to the width of the studs.

> ~~**Exception:** A single top plate may be installed in stud walls, provided the plate is adequately tied at joints, corners and intersecting walls by a minimum 3-inch by 6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side provided the rafters or joists are centered over the studs with a tolerance of no more than 1 inch (25 mm). The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates or equivalent as previously described.~~
>
> <u>**Exception:** A single top plate used as an alternative to a double top plate shall comply with the following:</u>
>
> 1. <u>The top plate shall be tied at corners an intersecting walls with a 3-inch by 6-inch by 0.036-inch-thick (76 mm by 152 mm by .0914 mm) galvanized steel plate or equivalent.</u>
> 2. <u>The steel plate tie at corners and intersecting walls shall be natiled to each wall or segment of wall with six 8d (2-1/2” x 0.113”) nails on each side of the joint.</u>
> 3. <u>Splices in the top plate at butt joints shall be tied with a 3-inch by 12-inch by 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate or equivalent.</u>
> 4. <u>The steel plate tie at butt joints shall be nailed to each segment of wall with twelve 8d (2-1/2” x 0.113”) nails on each side of the joint.</u>
> 5. <u>The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).</u>
> 6. <u>Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Items 1 and 2 for header connections at corners and intersections, and Items 3 and 4 for header connections made along a single wall line.</u>

Reason: This is a companion item to S284-12/13 <u>adopted</u> in Portland in the October Final Action Hearing.

Item 14 of the 2012 IRC Table R602.3(1) establishes the minimum capacity required to insure an adequate tension splice in top plates. Aside from simply providing continuity between wall segments, the top-plate splice also acts as a tension tie (often called a collector or drag strut) to distribute the roof and floor shear loads into the bracing elements often spaced as much as 20 feet apart. Assuming spruce-pine-fir top plates the Table R602.3(1), item 14 requires a top-plate splice with eight 16d box nails on each side of the splice. In accordance with the NDS Table 11N, assuming SPF plates and a duration of load of 1.6 for lateral loads, the design capacity of the item 14 connection is (88 lb/nail x 8 nails x 1.6 dol =) 1126 lbs.

While sufficient for intersections and corners the *3-inch by 6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side…”* only provides about 600 lbf tension capacity (NDS Table 11P, SPF framing, box nails: 60 lbf/nail x 6 nails x 1.6 dol = 576 lbf). This is about ½ of what is requires in Table R602.3(1), item 14. As such, the splice plate requirement for in-line butt joints in single top plate systems should be twice what is currently required:

> “…<u>at least the equivalent of 3-inch by 12-inch by a 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by twelve 8d (2-1.2” x 0.113”) nails on each side…”</u>

As a matter of clarification the type of nail to be used was described as only the penny-weight was specified. This is in keeping with current code style guidelines. I also specified which splice type was appropriate for headers when present. As these are neither corners nor intersections, it is clear that the butt-joint splice was the appropriate reference.

In addition, the reference to “a minimum” was deleted in favor of “at least the equivalent of” as it seemed more appropriate. “Lintels” was also changed in favor of “headers”, as lintels is a term more often associated with concrete construction where headers is more commonly used in wood construction.

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

R602.3.2-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: This change needs additional work based on the committee's previous action on RB274-13. The proponent will submit a public comment and bring back to the public comment hearing.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R602.3.2 Top plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches (610 mm). Joints in plates need not occur over studs. Plates shall be not less than 2-inches (51 mm) nominal thickness and have a width at least equal to the width of the studs.

~~**Exception:** A single top plate used as an alternative to a double top plate shall comply with the following:~~

1. ~~The top plate shall be tied at corners an intersecting walls with a 3-inch by 6-inch by 0.036-inch-thick (76 mm by 152 mm by .0914 mm) galvanized steel plate or equivalent.~~
2. ~~The steel plate tie at corners and intersecting walls shall be nailed to each wall or segment of wall with six 8d (2-1/2" x 0.113") nails on each side of the joint.~~
3. ~~Splices in the top plate at butt joints shall be tied with a 3-inch by 12-inch by 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate or equivalent.~~
4. ~~The steel plate tie at butt joints shall be nailed to each segment of wall with twelve 8d (2-1/2" x 0.113") nails on each side of the joint.~~
5. ~~The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).~~
6. ~~Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Items 1 and 2 for header connections at corners and intersections, and Items 3 and 4 for header connections made along a single wall line.~~

Exceptions: A single top plate used as an alternative to a double top plate shall comply with the following:

1. The single top plate shall be tied at corners, intersecting walls, and at in-line splices in straight wall lines in accordance with Table R602.3.2.
2. The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).
3. Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Table R602.3.2.

TABLE R602.3.2
SINGLE TOP-PLATE SPLICE CONNECTION DETAILS.

CONDITION	TOP-PLATE SPLICE LOCATION			
	Corners and Intersecting Walls		Butt Joints in Straight Walls	
	Splice Plate Size	Min. Nails Each Side of Joint	Splice Plate Size	Min. Nails Each Side of Joint
Structures in SDC A – C; and in SDC D_0, D_1 and D_2 with braced wall line spacing less than 25 feet	3" x 6" x 0.036" galvanized steel plate or equivalent	(6) 8d box(2-1/2" x 0.113") nails	3' x 12" x 0.036" galvanized steel plate or equivalent	(12) 8d box (2-1/2" x 0.113") nails
Structures in SDC D_0, D_1 and D_2, with braced wall line	3" by 8" by 0.036" galvanized steel plate	(9) 8d box (2-1/2" x 0.113") nails	3' x 16" x 0.036" galvanized steel plate	(18) 8d box (2-1/2" x 0.113") nails

spacing greater than or equal to 25 feet:	or equivalent		or equivalent	

For SI: 1 inch = 25.4mm. 1 foot = 304.8mm.

Commenter's Reason: The original code change proposal is a companion item to S284-12/13 adopted in Portland in the October Final Action Hearing. Item 14 of the 2012 IRC Table R602.3(1) establishes the minimum capacity required to insure an adequate tension splice when using a single top plate splice. We, as the proponents, asked for disapproved to permit us to alter this proposal to account for the second *double* top plate splice added to Table R602.3(1) via RB274-13. RB274-13 recognized the increased *double* top plate attachment requirements for higher seismic SDCs and when the braced wall spacing is 25 feet or greater. This new requirement for double top plate splices at in-line joints and at corners or intersections increases the required nailing by 50%.

As such, the *single* top plate splice requirements also increase by 50% when splices occur in SDC D_0, D_1 and D_2 with braced wall line spacing greater than or equal to 25 feet. With the addition of the high seismic double top plate requirement in IRC Table R602.3(1) as a result of RB274-13, it became necessary to ensure that the same capacity could be obtained by the prescriptive single top-plate splice provisions in Section R602.3.2. This Public Comment adds the single top plate splice requirements for SDC D_0, D_1 and D_2 with braced wall line spacing greater than or equal to 25 feet.

RB284-13

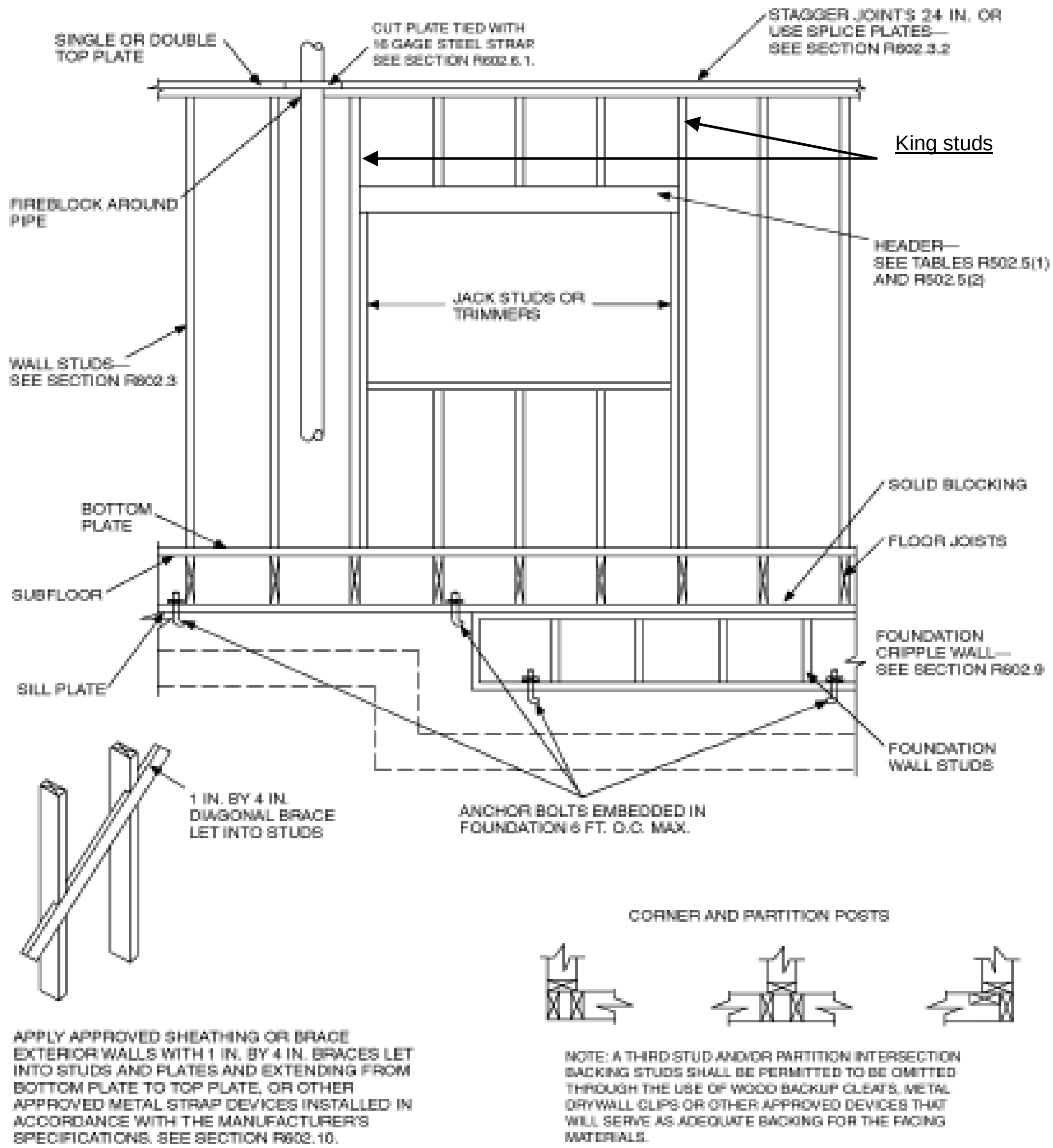
Final Action: AS AM AMPC____ D

RB286-13
Figure R602.3(2), R602.7.4 (New)

<u>Proposed Change as Submitted</u>

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

Revise as follows:



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R602.3(2)
FRAMING DETAILS

<u>602.7.4 Supports for headers.</u> <u>Headers shall be supported on each end with one or more jack studs in accordance with Table R502.5(1) or Table R502.5(2). A king stud shall be adjacent to the jack stud on each end of the header and nailed at each end of the header with 4-16d nails.</u>

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

The code is silent about how headers should be supported to prevent header rotation. The king studs should be used to stabilize the header with nails on each end.

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

R602.7.4 (NEW)-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

602.7.4 Supports for headers. Headers shall be supported on each end with one or more jack studs in accordance with Table R502.5(1) or Table R502.5(2), or approved framing anchors.. A king stud shall be installed ~~adjacent to the jack stud~~ on each end of the header and face nailed at each end of the header with 4-16d nails (3.5" x 0.135").

Committee Reason: Approval was based upon the proponent's published reason and the modification. The modification adds clarity for the header supports.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

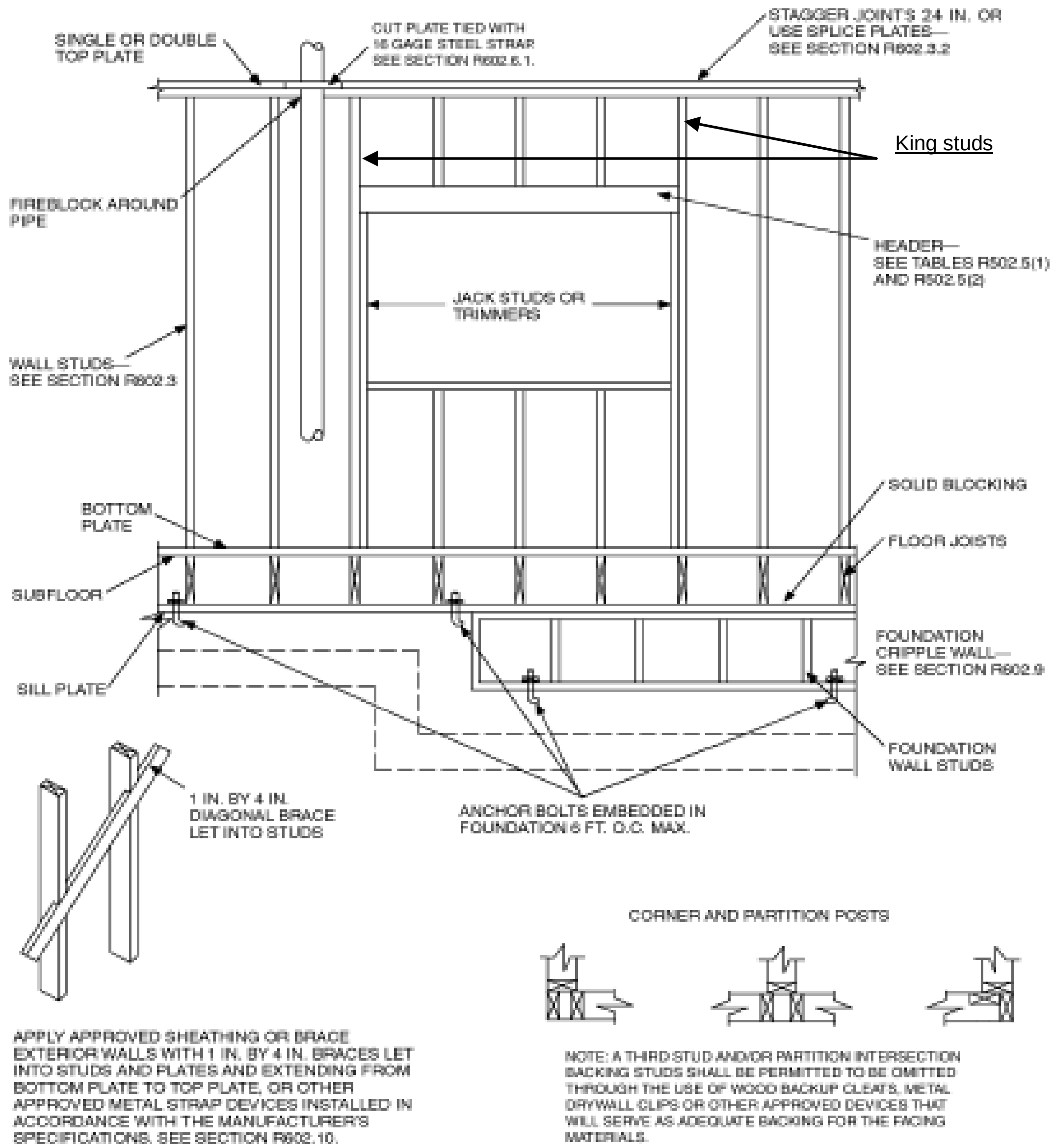
Dennis Pitts, American Wood Counctil, requests Approval as Modified by this Public Comment.

Further Modify the proposal as follows:

602.7.4 Supports for headers. Headers shall be supported on each end with one or more jack studs or with approved framing anchors in accordance with Table R502.5(1) or Table R502.5(2) ~~, or approved framing anchors~~. ~~A king stud shall be installed~~ The full height stud adjacent to ~~on~~ each end of the header ~~and~~ shall be ~~face~~ end nailed ~~at~~ to each end of the header with 4-16d nails (3.5"x 0.135"). The minimum number of full height studs at each end of a header shall be in accordance with Table R602.7.4.

TABLE R602.7.4
MINIMUM NUMBER OF FULL HEIGHT STUDS
AT EACH END OF HEADERS IN EXTERIOR WALLS

Header Span (feet)	Maximum Stud Spacing (in.) per Table R602.3(5)	
	16	24
≤ 3'	1	1
4'	2	1
8'	3	2
12'	5	3
16'	6	4



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R602.3(2)
FRAMING DETAILS

Replace “KING STUDS” with “FULL HEIGHT STUDS ADJACENT TO HEADER – SEE SECTION R602.7.4”

Commenter’s Reason: During the Committee Hearings, several proposals were approved with varying requirements for full height stud at ends of headers (i.e. RB286, RB287 and RB288). This public comment intends to provide consistency in requirements. Separate public comments to RB287 and RB288 are proposed to allow coordination with proposed revisions in this public comment.

Proposed modifications utilize the term “full height stud” in lieu of “king stud” to be more consistent with terminology currently used in the IRC and Wood Frame Construction Manual (WFCM). The minimum number of full height studs is based on header span and maximum stud spacing in order to maintain the number of studs displaced by the opening over which the header spans. The current requirement for only one full-height at each end of longer headers is appropriate for shorter header spans but inadequate for longer header spans.

The maximum stud spacing per Table R602.3(5) is specifically listed in the column heading to make clear that the maximum stud spacing, not actual stud spacing, is the determining factor for the number of required full height studs at each end of the header. In construction, actual stud spacing is often 16” on center; however, the maximum stud spacing often permitted in the IRC is 24” on center. If the actual stud spacing is used and is less than the maximum stud spacing per Table R602.3(5), the required number of full height studs at each end of the header would be over-estimated.

RB286-13

Final Action: AS AM AMPC____ D

RB287-13
R602.7, R602.7.1, Table R602.7.1, Table R602.7.1(2) (NEW)

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing self (jcrandell@aresconsulting.biz)

Revise as follows:

R602.7 Headers. For header spans see Tables R502.5(1), R502.5(2), and R602.7.1(1).

R602.7.1 Single member headers. Single headers shall be framed with a single flat 2-inch-nominal (51 mm) member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures R602.7.1(1) and R602.7.1(2). The number of king studs required at each end of a single member header shall comply with Table R602.7.1(2). The total number of king studs provided at both ends of a single member header need not exceed the number of layout studs displaced by the wall opening.

TABLE R602.7.1(1)
SPANS FOR MINIMUM No.2 GRADE SINGLE HEADER[a, b, c, f]

SINGLE HEADERS SUPPORTING	SIZE	WOOD SPECIES	GROUND SNOW LOAD (psf)								
			≤ 20[d]			30			50		
			Building Width (feet)[e]								
			20	28	36	20	28	36	20	28	36
Roof and ceiling	2 × 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir ~~or Southern Pine~~	4-10 5-1 5-3	4-2 4-4 4-6	3-8 3-10 4-0	4-3 4-6 4-7	3-8 3-10 3-11	3-3 3-5 3-6	3-7 3-9 3-10	3-0 3-2 3-3	2-8 2-10 2-11
	2 × 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	6-2 6-6 6-8	5-3 5-6 5-8	4-8 4-11 5-1	5-5 5-8 5-10	4-8 4-11 5-0	4-2 4-4 4-6	4-6 4-9 4-11	3-11 4-1 4-2	3-1 3-7 3-9
	2 × 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	7-6 7-10 8-1	6-5 6-9 6-11	5-9 6-0 6-2	6-7 6-11 7-2	5-8 5-11 6-1	4-5 5-3 5-5	5-4 5-9 5-11	3-11 4-8 5-1	3-1 3-8 4-6
Roof, ceiling and one center-bearing floor	2 × 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir ~~or Southern Pine~~	3-10 4-0 4-1	3-3 3-5 3-7	2-11 3-1 3-2	3-9 3-11 4-1	3-3 3-5 3-6	2-11 3-0 3-1	3-5 3-7 3-8	2-11 3-0 3-2	2-7 2-8 2-9
	2 × 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern~~	4-11 5-1 5-3	4-2 4-5 4-6	3-8 3-11 4-1	4-10 5-0 5-2	4-1 4-4 4-5	3-6 3-10 4-0	4-4 4-6 4-8	3-7 3-11 4-0	2-10 3-4 3-7

		~~Pine~~									
	2 × 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	5-8 5-11 6-1	4-2 4-11 5-3	3-4 3-11 4-8	5-5 5-10 6-0	4-0 4-9 5-2	3-6 4-2 4-10	4-9 5-5 5-7	3-6 4-2 4-10	2-10 3-4 4-3
Roof, ceiling and one clear span floor	2 × 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir ~~or Southern Pine~~	3-5 3-7 3-8	2-11 3-1 3-2	2-7 2-9 2-10	3-4 3-6 3-7	2-11 3-0 3-1	2-7 2-8 2-9	3-3 3-5 3-6	2-10 2-11 3-0	2-6 2-7 2-9
	2 × 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	4-4 4-7 4-8	3-7 3-11 4-0	2-10 3-5 3-7	4-3 4-6 4-7	3-6 3-10 4-0	2-9 3-3 3-6	4-2 4-4 4-6	3-4 3-9 3-10	2-7 3-1 3-5
	2 × 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir ~~or Southern Pine~~	4-11 5-6 5-8	3-7 4-3 4-11	2-10 3-5 4-4	4-9 5-6 5-7	3-6 4-2 4-10	2-9 3-3 4-3	4-6 5-4 5-6	3-4 3-11 4-8	2-7 3-1 4-2

For SI: 1 inch=25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Table is based on a maximum roof-ceiling dead load of 15 psf.

c. The header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header in lieu of the required jack stud.

d. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.

e. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

f. The header shall bear on a minimum of one jack stud at each end.

TABLE R602.7.1(2)
NUMBER OF KING STUDS REQUIRED AT EACH END OF A SINGLE MEMBER HEADER[a]

STUD SIZE	OPENING WIDTH (FEET)	BASIC WIND SPEED (MPH) & EXPOSURE CONDITION																	
		85/B			90/B			100/B, 85/C			110/B, 90/C, 85/D			120/B, 100/C, 90/D			130/B, 110/C, 100/D		
		WALL HEIGHT (FEET)																	
		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
2x4	2	1	1	2	1	1	2	1	2	2	2	2	2	2	2	3	2	2	3
	3	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4
	4	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	3	4
	6	2	2	3	2	2	3	2	3	3	3	3	4	3	4	5	4	4	5
	8	2	3	3	2	3	3	3	3	4	3	4	5	4	5	6	4	5	7
	10	2	3	4	3	3	4	3	4	5	4	5	6	4	6	7	5	6	8
2x6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2
	4	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2
	6	1	1	1	1	1	2	1	2	2	1	2	2	2	2	2	2	2	3
	8	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3
	10	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	3	3	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber.

Reason: This proposal provides king stud requirements for wall openings spanned by single member headers to ensure structural integrity to compensate for removal of full-height layout studs over the span of the wall opening. The number of king studs required is based on wind loading only because the jack stud required with single member headers supports gravity loading (as is the case with the header requirements in Chapter 5). This proposal is in response to discussions with a concerned code official subsequent to approval of the single member header provisions last code cycle. The changes to renumbered Table R602.7.1(1) are intended to align with Southern Pine design value changes forthcoming for the respective single member header sizes.

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

R602.7-RB-CRANDELL.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a needed change that addresses the issue of king studs at single headers.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R602.7.1 Single member headers. Single headers shall be framed with a single flat 2-inch-nominal (51 mm) member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures R602.7.1(1) and R602.7.1(2) and face nailed to the top and bottom of the header with 10d box nails (3" x 0.128") spaced 12" o.c.

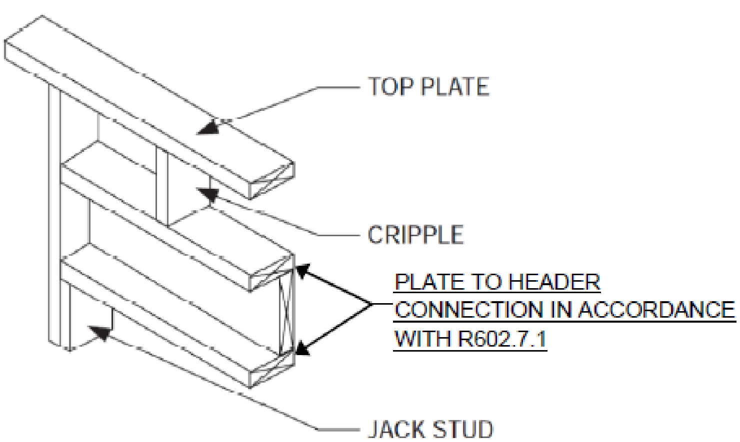


FIGURE R602.7.1(1)
SINGLE MEMBER HEADER IN EXTERIOR BEARING WALL

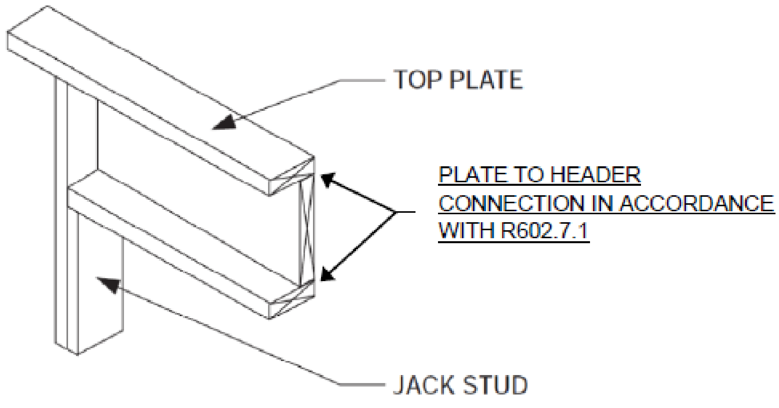


FIGURE R602.7.1(2)
ALTERNATIVE SINGLE MEMBER HEADER WITHOUT CRIPPLE

Commenter's Reason: This proposal specifies nailing of the plates to the header as a means of bracing the header to limit development of out-of-plane buckling under gravity loads. The specified nailing matches recommended nailing for double top plate connections in accordance with RB272 (which was approved as submitted). Additional labeling of the referenced single ply header figure is provided to clarify location of intended nailing between plates and header.

Replacement of RB287 (which was recommended for approval as submitted) is being proposed with this public comment to remove inconsistencies and duplication resulting from two other proposals as follows:

a) RB286 (approved as modified) addresses full-height stud requirements for all headers – not just single ply headers. Retention of full-height stud requirements in RB287 as approved by the IRC committee will result in inconsistent full-height stud requirements for support of single ply headers relative to multi-ply headers.

b) RB252 (approved as submitted) corrects spans for single ply headers to account for Southern Pine design values changes and incorporates single ply header spans in the existing header table. Retention of single ply header spans in RB287 as approved by the IRC committee will result in inconsistent header spans from those in the approved as modified version of RB252 to reflect new Southern Pine design values.

RB287-13

Final Action: AS AM AMPC____ D

RB288-13

R602.7, R602.7.2 (NEW), Table R602.7.2(1) (NEW), Table R602.7.2(2) (NEW), Table R602.7.3(1) (NEW), R602.7.3(2) (NEW), Figure R602.7.2 (NEW)

Proposed Change as Submitted

Proponent: Vladimir Kochkin, NAHB Research Center, Inc. (vkochkin@nahbrc.org), Jay H. Crandell, P.E., ARES Consulting (jcrandell@aresconsulting.biz)

Revise as follows:

R602.7 Headers. For header spans and number of jack studs required, see Tables R502.5(1), R502.5(2)~~,~~ ~~and~~. For single member header requirements, refer to Section R602.7.1. For rim board header requirements, refer to Section R602.7.2.

R602.7.2 Rim Board Headers. Rim board header size, material, and span shall be in accordance with Tables R602.7.2(1) and R602.7.2(2). Rim board headers shall be constructed in accordance with Figure R602.7.2 and shall be supported at each end by king studs. The number of king studs required to support each end of a rim board header shall comply with greater number from Table R602.7.3(1) and Table R602.7.3(2). For 2x6 walls with a single top plate and for 2x4 walls, the number of king studs shall not be less than two at each end of a two-ply rim board header. The total number of king studs provided at both ends of the rim board header need not exceed the number of layout studs displaced by the wall opening. Each ply of built-up king studs shall be face-nailed to the adjacent ply with 2-10d (3” x 0.128”) nails at 16 inches on center. Rim board headers supporting concentrated loads, such as reactions from floor or roof girders or wall opening framing above the rim board header, shall be designed.

TABLE R602.7.2(1)
MAXIMUM ALLOWABLE SPANS FOR SINGLE-PLY RIM BOARD HEADERS[a,b]

RIM HEADERS SUPPORTING:	SIZE	WOOD SPECIES OR TYPE[d]	GROUND SNOW LOAD (psf) ≤ 20[e]			30			50		
			Building Width (feet) 20[f]	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2x10	SPF-S, SYP	5-7	4-11	4-5	5-1	4-5	3-8	4-3	3-3	2-7
		HF	5-11	5-2	4-8	5-3	4-7	4-2	4-6	3-11	3-2
		DF	6-1	5-4	4-9	5-5	4-9	4-3	4-8	4-0	3-7
	2x12	SPF-S, SYP	6-10	5-8	4-7	5-11	4-6	3-8	4-3	3-3	2-7
		HF	7-2	6-3	5-6	6-5	5-5	4-5	5-2	3-11	3-2
		DF	7-4	6-5	5-10	6-7	5-9	5-2	5-8	4-11	4-4
	1-1/8"x 9-1/2"	Engr. Wood	4-5	3-10	3-6	3-11	3-5	3-1	3-4	2-11	2-7
	1-1/8"x 11-7/8"		5-6	4-10	4-4	4-11	4-4	3-11	4-2	3-8	3-2
	1-1/4"x 9-1/2"	Engr. Wood	6-4	5-7	5-0	5-9	5-0	4-6	4-10	4-3	3-9
	1-1/4"x 11-7/8"		7-7	6-8	6-0	6-10	5-11	5-4	5-10	5-0	4-5
Roof, ceiling, wall, and one center-bearing floor[c]	2x10	SPF-S, SYP	4-11	4-1	3-3	4-10	3-11	3-2	4-4	3-2	2-6
		HF	5-1	4-5	3-11	5-0	4-4	3-9	4-6	3-10	3-1
		DF	5-3	4-6	4-0	5-2	4-5	4-0	4-8	4-0	3-7
	2x12	SPF-S, SYP	5-6	4-1	3-3	5-4	3-11	3-2	4-4	3-2	2-6
		HF	6-3	5-0	3-11	6-1	4-9	3-9	5-3	3-10	3-1
		DF	6-5	5-6	4-11	6-3	5-5	4-10	5-8	4-10	4-3
	1-1/8"x 9-1/2"	Engr. Wood	3-10	3-3	2-11	3-9	3-3	2-11	3-5	2-11	2-6
	1-1/8"x 11-7/8"		4-9	4-1	3-8	4-8	4-0	3-7	4-3	3-7	3-1
	1-1/4"x 9-1/2"	Engr. Wood	5-6	4-9	4-3	5-5	4-8	4-2	4-11	4-2	3-9
	1-1/4"x 11-7/8"		6-7	5-8	5-1	6-6	5-7	5-0	5-10	5-0	4-3
Roof, ceiling, wall and one clear span floor[c]	2x10	SPF-S, SYP	4-4	3-3	2-7	4-3	3-2	2-6	4-0	2-11	2-4
		HF	4-7	3-11	3-1	4-6	3-9	3-0	4-4	3-7	2-10
		DF	4-8	4-0	3-7	4-7	4-0	3-6	4-6	3-10	3-5
	2x12	SPF-S, SYP	4-5	3-3	2-7	4-3	3-2	2-6	4-0	2-11	2-4
		HF	5-4	3-11	3-1	5-2	3-9	3-0	4-10	3-7	2-10
		DF	5-8	4-11	4-4	5-7	4-10	4-2	5-6	4-8	3-11
	1-1/8"x 9-1/2"	Engr. Wood	3-5	2-11	2-7	3-4	2-11	2-7	3-3	2-10	2-6
	1-1/8"x 11-7/8"		4-3	3-8	3-2	4-2	3-7	3-1	4-1	3-6	2-11
	1-1/4"x 9-1/2"	Engr. Wood	4-11	4-3	3-9	4-10	4-2	3-8	4-9	4-1	3-7
	1-1/4"x 11-7/8"		5-10	5-0	4-4	5-9	4-11	4-2	5-7	4-10	3-11

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.
b. Table is based on a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.
c. Floor joists framing into rim header shall be attached to the rim header using joist hangers sized to support the joist bearing load or an approved design.
d. Solid sawn wood rim members shall be minimum No. 2 grade. Engineered wood rim members shall meet or exceed the following material design properties and comply with applicable usage limitations in accordance with the manufacturer's approved data:
1-1/8" members: F_b=600 psi, F_v=270 psi, E=550,000 psi, $F_{c,perp}$=550 psi
1-1/4" members: F_b=1,130 psi, F_v=355 psi, E=660,750 psi, $F_{c,perp}$=680 psi
e. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.
f. To determine the allowable span for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.2(2)
MAXIMUM ALLOWABLE SPANS FOR TWO-PLY RIM BOARD HEADERS[a,b]

RIM HEADERS SUPPORTING:	SIZE	WOOD SPECIES OR TYPE[d]	GROUND SNOW LOAD (psf) ≤ 20[e]			30			50		
			Building Width (feet) 20[f]	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8"x 9-1/2"	Engr. Wood	6-3	5-5	4-11	5-7	4-11	4-5	4-9	4-2	3-8
	(2)1-1/8"x 11-7/8"		7-9	6-10	6-2	7-0	6-1	5-6	5-11	5-2	4-7
	(2)1-1/4"x 9-	Engr.	8-4	7-8	7-1	7-9	7-1	6-4	6-11	6-0	5-4

	1/2” (2)1-1/4”x 11-7/8”	Wood	10-5	9-5	8-6	9-8	8-5	7-7	8-2	7-1	6-5
Roof, ceiling, wall, and one center-bearing floor[c]	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8”x 9-1/2” (2)1-1/8”x 11-7/8”	Engr. Wood	5-5 6-9	4-8 5-10	4-2 5-2	5-4 6-8	4-7 5-8	4-1 5-1	4-9 6-0	4-1 5-1	3-8 4-7
	(2)1-1/4”x 9-1/2” (2)1-1/4”x 11-7/8”	Engr. Wood	7-7 9-4	6-9 8-0	6-0 7-2	7-6 9-2	6-7 7-10	5-11 7-0	6-11 8-3	5-11 7-1	5-3 6-3
Roof, ceiling, wall and one clear span floor[c]	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8”x 9-1/2” (2)1-1/8”x 11-7/8”	Engr. Wood	4-10 6-0	4-2 5-9	3-8 4-7	4-9 5-11	4-1 5-1	3-7 4-6	4-7 5-9	3-11 4-11	3-6 4-4
	(2)1-1/4”x 9-1/2” (2)1-1/4”x 11-7/8”	Engr. Wood	7-0 8-4	6-0 7-1	5-4 6-4	6-10 8-2	5-11 7-0	5-3 6-3	6-8 7-11	5-9 6-10	5-1 5-11

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Table is based on a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.

c. Floor joists framing into rim header shall be attached to the rim header using joist hangers sized to support the joist bearing load or an approved design.

d. For solid sawn wood, refer to Table R502.5(1). Engineered wood rim members shall meet or exceed the following material design properties and comply with applicable usage limitations in accordance with the manufacturer’s approved data and usage limitations:
1-1/8” members: F_b=600 psi, F_v=270 psi, E=550,000 psi, $F_{c,perp}$=550 psi
1-1/4” members: F_b=1,130 psi, F_v=355 psi, E=660,750 psi, $F_{c,perp}$=680 psi

e. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.

f. To determine the allowable span for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with “roof, ceiling, and wall” support condition.

TABLE R602.7.3(1)
NUMBER OF KING STUDS REQUIRED FOR GRAVITY LOAD RESISTANCE[a]

KING POST SUPPORTING:	OPENING WIDTH (FEET)	2x4 FRAMING									2x6 FRAMING								
		GROUND SNOW LOAD (PSF)									GROUND SNOW LOAD (PSF)								
		≤ 20[b]			30			50			≤ 20			30			50		
		BUILDING WIDTH (FEET)									BUILDING WIDTH (FEET)								
		20[c]	28	36	20	28	36	20	28	36	20	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	1	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1
	6	2	2	2	2	2	3	2	3	3	1	1	1	1	1	1	1	2	2
	8	2	2	3	2	3	3	3	4	5	1	1	2	1	2	2	2	2	2
	10	2	3	3	3	3	4	4	5	6	1	2	2	1	2	2	2	2	3
	12	3	3	4	3	4	5	4	5	6	1	2	2	2	2	2	2	3	3
Roof, ceiling, wall, and one center-bearing floor[c]	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	2	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	1	2	2	1	2	2	2	2	3	1	1	1	1	1	1	1	1	1
	6	2	2	3	2	2	3	2	3	4	1	1	2	1	1	2	1	2	2
	8	2	3	4	2	3	4	3	4	5	1	2	2	1	2	2	2	2	2
	10	3	4	4	3	4	5	3	5	6	2	2	2	2	2	2	2	2	3
	12	3	4	5	3	4	5	4	5	7	2	2	3	2	2	3	2	3	3
Roof, ceiling, wall and one clear span floor[c]	2	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
	3	1	2	2	1	2	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	2	2	3	2	2	3	2	2	3	1	1	1	1	1	1	1	1	2
	6	2	3	4	2	3	4	2	3	4	1	2	2	1	2	2	1	2	2
	8	3	4	5	3	4	5	3	4	5	2	2	2	2	2	2	2	2	3
	10	3	5	6	4	5	6	4	5	6	2	2	3	2	2	3	2	3	3
	12	4	5	7	4	5	7	4	6	7	2	3	3	2	3	3	2	3	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber, a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.

b. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.

c. To determine the required number of king studs for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.3(2)
NUMBER OF KING STUDS REQUIRED FOR WIND LOAD RESISTANCE[a]

STUD SIZE	OPENING WIDTH (FEET)	BASIC WIND SPEED (MPH) & EXPOSURE CONDITION																	
		85/B			90/B			100/B, 85/C			110/B, 90/C, 85/D			120/B, 100/C, 90/D			130/B, 110/C, 100/D		
		WALL HEIGHT (FEET)																	
		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
2x4	2	1	1	2	1	1	2	1	2	2	2	2	2	2	2	3	2	2	3
	3	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4
	4	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	3	4
	6	2	2	3	2	2	3	2	3	3	3	3	4	3	4	5	4	4	5
	8	2	3	3	2	3	3	3	3	4	3	4	5	4	5	6	4	5	7
	10	2	3	4	3	3	4	3	4	5	4	5	6	4	6	7	5	6	8
	12	3	3	4	3	4	5	4	5	6	4	5	7	5	6	7	6	7	8
2x6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2
	4	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2
	6	1	1	1	1	1	2	1	2	2	1	2	2	2	2	2	2	2	3

	8	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3
	10	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	3	3	4
	12	2	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	4	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber.

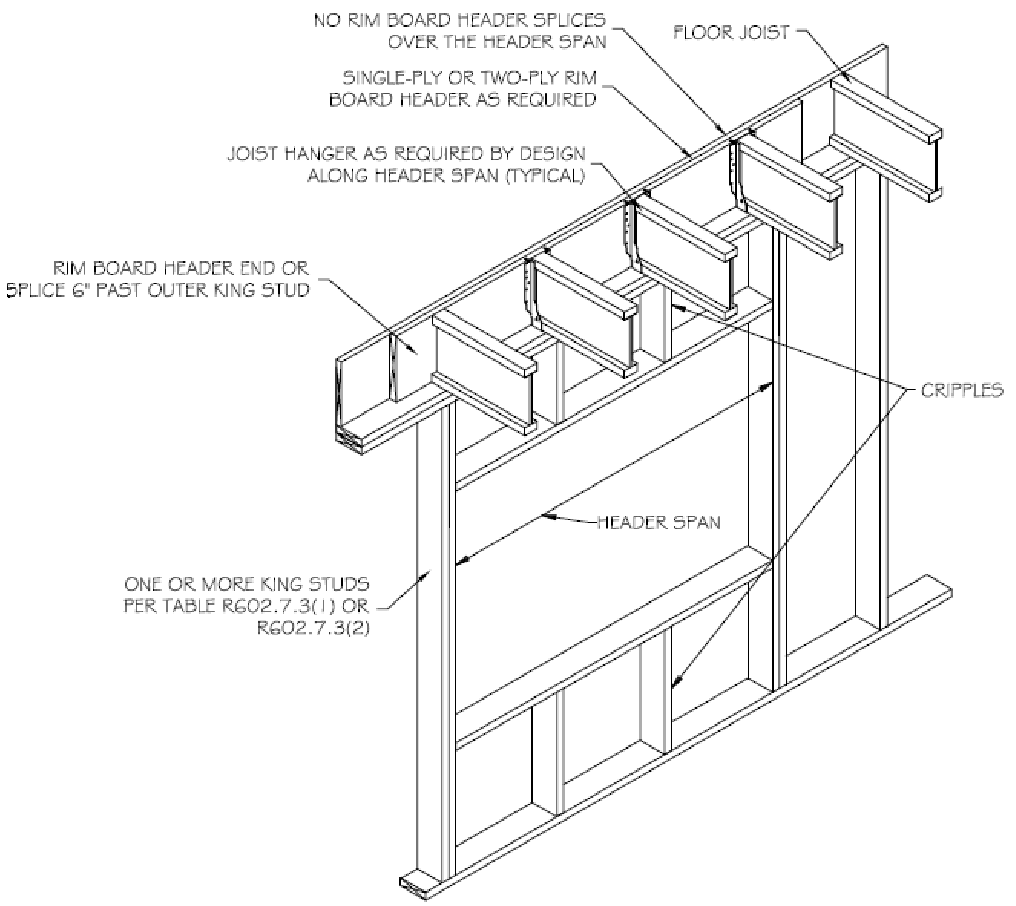


FIGURE R602.7.2
RIM BOARD HEADER CONSTRUCTION

Reason: This proposal adds a rim board header option to promote more resource and energy efficient wall framing. The analysis of rim board headers for this proposal is based on the same methodology applied for the existing IRC provisions for single headers and is consistent with header analysis as applied in the Wood Frame Construction Manual (WFCM). Both solid sawn and engineered wood members are included. King stud requirements are added to ensure adequate support of rim board headers and out-of-plane wind load resistance as this type of header construction uses only king studs which serve as jamb or trimmer studs for the wall opening below.

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

R602.7-RB-KOCHKIN.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a much needed change because rim board headers are more energy efficient and it brings advanced framing technique in the code. The opponent will work with the proponent to bring back a public comment to address the changes in the modification that was disallowed.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R602.7.2 Rim Board Headers. Rim board header size, material, and span shall be in accordance with Table R602.7.1 for single-ply rim board headers and Table R502.5(1) for two-ply rim board headers. Rim board headers shall be constructed in accordance with Figure R602.7.2 and shall be supported at each end by full height studs. The number of full height studs at each end shall not be less than the number of studs displaced by half of the header span based on the maximum stud spacing in accordance with Table R602.3(5). Rim board headers supporting concentrated loads shall be designed in accordance with accepted engineering practice.

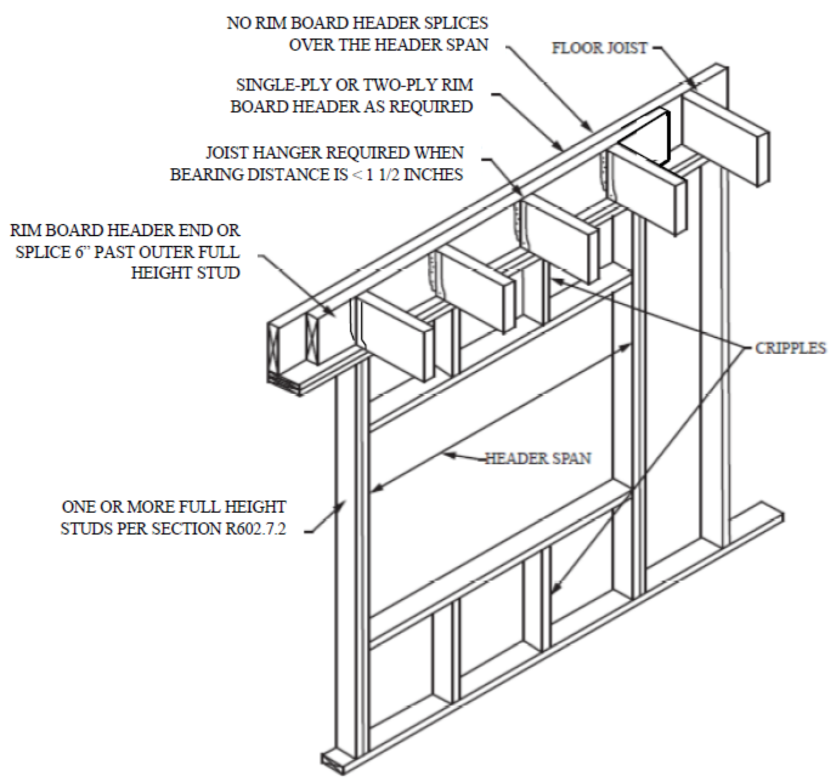


FIGURE R602.7.2
RIM BOARD HEADER CONSTRUCTION

Commenter's Reason: This public comment replaces RB288 (which was recommended for approval as submitted) with simplified requirements for sawn lumber rim board headers based on referencing existing header tables updated by Committee action on RB250 (which was approved as modified), RB252 (which was approved as submitted), and RB286 (which was approved as modified).

Committee action on RB250 and RB252 establishes updated header spans for single ply and multi ply headers to account for changes in Southern Pine design values. Those header spans are equally applicable to rim board headers without required duplication of span information in separate rim board header tables. Reference to existing header tables removes unwarranted inconsistencies in tabulated spans and simplifies the code. It should be noted that RB252-13 combines Tables R602.7.1 and R502.5(1) into a single table R602.7(1). That change will necessitate the reference in the first sentence of this proposal to be changed to "Rim board header size, material, and span shall be in accordance with Table R602.7(1)."

Committee action on RB286 established full height stud requirements. A public comment to RB286 accounts for varying required number of full height studs based on header span and maximum stud spacing. This public comment is based on the same approach for determining the number of full height studs to support the rim board header and greatly simplifies the code while ensuring adequate full height stud support of rim board headers.

Importantly, this public comment is applicable to only sawn lumber rim board headers. Spans for engineered rim board headers are not included in this public comment because standardized design values across manufacturers are not available and in some cases engineered rim boards are not permitted to span over openings. A modification proposed at the hearing in Dallas by the proponent was ruled out of order. The committee indicated that they wanted a public comment to make the corrections even though the floor modification was ruled out of order. AWC has worked with the proponent to develop this public comment.

Nailing of full height studs it is addressed by minimum nailing for stud to stud connections and is therefore not included in the simplified proposal to avoid unnecessary duplication with the minimum nailing schedule table.

RB288-13

Final Action: AS AM AMPC____ D

RB302-13
Table R602.10.3(4)

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR [a,b] [Multiply length from Table R602.10.3(3) by this factor]	APPLICABLE METHODS
Walls with stone or masonry veneer, town-houses in SDC-C [~~d~~,e,f]	(Figure)	1.0		All intermittent and continuous methods
	(Figure)	1.5		
	(Figure)	1.5		

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
a. Linear interpolation shall be permitted.
b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.
c. The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.
d. Applies to stone or masonry veneer exceeding the first story height. See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height.
e. The adjustment factor for stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls.
f. Applies to stone and masonry veneer exceeding the first story height and not extending up into the gable end.

(Portions of Table not shown remain unchanged)

Reason: The purpose of these proposals is to clarify the IRC.

1. The reference to Section R602.10.6.5 in the second portion of Footnote d is clearly applicable to SDCs D_0, D_1 and D_2 only. The above portion of the table is applicable to townhouses in SDC C. It is confusing referencing a footnote, part of which is clearly not relevant. It calls into question the relevant portions of the footnote. As the first portion of footnote d is applicable to townhouses in SDC C, to avoid confusion we propose the relevant information be duplicated in its own Footnote f.
2. The second portion of the proposed footnote adds the gable end to the not-to-extend criteria. The IRC is clear that the line of demarcation between using the standard bracing provisions and the Method BV-WSP is when the brick or masonry veneer extends up past the first story height. It is not clear what to do when the veneer extends up the gable-end wall. The definition of story in Chapter 2 provided below could lead one to believe that the gable–end wall was part of the story below:

   STORY. *That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.*

   From a structural perspective, however the mass in a gable end-wall can equal or exceed the mass of a veneered second story. For example, a 40-foot wide building with a 12:12 pitch can have gable-end wall that is a maximum of 20 feet tall above the top of the wall below. As the area is triangular the average height of this gable-end wall is 10 feet tall. This is the same mass as a veneered 10 foot second story wall.

   It is clearly NOT the intent of the IRC to permit the standard bracing provisions for only a single story UNLESS the same or larger mass is part of a gable-end wall. The above proposal clarifies the intent of this section with respect to veneered gable-end walls.

   This portion of the proposed change is duplicated in another code change proposal.

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

R602.10.3(4)T #2-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based upon the proponent's request for disapproval. There is information missing and a pointer is needed to refer back to the proper code section.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward L. Keith, APA – The engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR [a,b] [Multiply length from Table R602.10.3(3) by this factor]	APPLICABLE METHODS
Walls with stone or masonry veneer, town-houses in SDC-C [d,e~~,f~~]	(Figure)	1.0		All intermittent and continuous methods
	(Figure)	1.5		
	(Figure)	1.5		
Walls with stone or masonry veneer, detached one-and two-family dwellings in SDC $D_0 – D_2$ [d,f]	Any story	See Table R602.10.6.5		BV-WSP

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.

d. Applies to stone or masonry veneer exceeding the first story height. ~~See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height~~.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

f. ~~Applies to stone and masonry veneer exceeding the first story height and not extending up into the gable end~~. See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height

Commenter's Reason: While RB302 accurately reflects the intent of the existing provisions of the 2012 IRC, clarifying the intent has made it evident that there was a hole in the existing provisions. The existing provisions fail to provide guidance on what to do when the brick or stone veneer extends up into the gable end. APA worked with industry to try to fill this hole but was *unable to come up with an agreement* on just how to do so. It was also pointed out that any addition of such new material to the code could be construed as being outside the scope of a Public Comment.

As an agreement was *not to be reached* at this time I am submitting this public comment to only correct the footnote problems currently in the code and described in the original code submittal.

In short, the reference to Section R602.10.6.5 in the second portion of footnote d is clearly applicable to SDCs D_0, D_1 and D_2 only. The table as published in the 2012 IRC has this footnote listed is applicable to townhouses in SDC C, as shown above. It is confusing to the user to have a footnote, part of which is clearly not relevant as it calls into question the relevant portions of the footnote. As the first portion of footnote d is applicable to townhouses in SDC C as well as SDC D+, to avoid confusion we propose to remove the portion of footnote d that is relevant only for SDC D+ and move that SDC D+-only portion to a new footnote (footnote f) and reference this only in SDC D+ row in the table.

The portion of the proposed footnote, "~~and not extending up into the gable end~~" was not part of the original footnote d and was part of the compromise that *could not be achieved* during the interim. It is thus removed, making the proposed change as modified by this Public Comment essentially an editorial clarification of the table.

We recommend overturning the committee's recommendation for denial and approve this much needed footnote clarification.

RB302-13

Final Action: AS AM AMPC____ D

RB308-13
R602.10.4.4 (NEW), Table R602.10.4.4 (NEW)

Proposed Change as Submitted

Proponent: Kirk Grundahl, Qualtim, representing the Structural Building Components Association (SBCA) (kgrundahl@qualtim.com)

Add new text as follows:

R602.10.4.4 Design Values. For the purpose of braced wall design, the capacity of wood structural panels to resist lateral loads, as found in Table R 602.10.3(1) are found in Table R602.10.4.4.

TABLE R602.10.4.4
SIMPLIFIED SHEAR VALUES FOR BRACED WALL LINES

Sheathing Material	**Bottom plate connection to foundation**	**Fastener**	**Fastener Spacing**	**Any Species Stud Framing**		
				Tested capacity	**System Effects Factor**	**IRC Lateral Design Capacity**
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing -- Wind.	Anchor bolts in accordance with code requirements	6d (2" x 0.113" nails) or 8d (2 1/2 x 0.131"	6:12	335	1.80	600
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing (with 1/2" gypsum on interior face of wall. -- Wind	Anchor bolts in accordance with code requirements	6d (2" x 0.113") or 8d (2 1/2 x 0.131"nails and Types S or W drywall screws.	6:12 WSP & 16:16 for GWB	465	1.80	840

a.The lateral design capacity of braced wall panels is based on full scale wall assembly tests using the minimum restraint provisions of the IRC, further adjusted by the partial restraint/systems effect factor.

Reason: Over the past several years, SBCRI has conducted a great deal of research into the requirements of the IRC, section R602.10 and the design capacity of wall assemblies built to those provisions. Table R602.10.3(1), Bracing Requirements Based on Wind Speed, was developed by the Ad-Hoc Wall Bracing Committee. The Lateral Design Capacity shown in the table above is the capacity determined by the committee to be used as the nominal strength of braced wall panels built to the minimum requirements of the IRC and using Method WSP. The braced wall panel lengths shown in Table R602.10.3(1) were calculated using these values. The system effect factor shown simply shows the factor required to be multiplied by the actual performance wood structural panels in buildings constructed to the minimum requirements of the IRC in order to achieve the stated lateral design capacity. This factor accounts for the increase in capacities due to additional framing, interior partitions, floor and ceiling framing, corner framing, etc. The tested capacities shown are the approximate capacities of wood structural panels used in buildings built to the minimum requirements of the IRC. Table R602.10.1 simply adds design value transparency to this section to show what the assumed system effect is once all of the building's construction detailing has been completed (i.e. additional strength from the addition of interior partitions, windows and doors, corner framing, interior gypsum, etc.). This approach is intended to be an aid to all registered design professionals as they make decisions about how best to resist applied loads and the safety considerations thereof. Full details of this research can be found at http://sbcri.info/bwpex.php and additional background on current design values is found here http://sbcri.info/bcters.php In addition, the Background on how the IRC wall bracing provisions were derived can be found in an article by Crandell-Martin in the spring 2009 edition of Wood Design Focus, " The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)"

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

R602.10.4.4 (NEW)-RB-GRUNDAHL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based upon the proponent's request for disapproval and the committee's action on RB309-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Larry Wainright, Qualtim, representing Structural Building Components Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.10.4.4
SIMPLIFIED SHEAR VALUES FOR WIND LOADING BRACED WALL LINES

Sheathing Material	Bottom plate connection to foundation	Fastener	Fastener Spacing	Any Species Stud Framing		
				Tested capacity	System Effects Factor	IRC Lateral Design Capacity
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing -- ~~Wind.~~	Anchor bolts in accordance with code requirements	6d (2" x 0.113" nails) or 8d (2 1/2 x 0.131"	6:12	~~335~~ 350	1.80	600
3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing (with 1/2" gypsum on interior face of wall~~. -- Wind~~	Anchor bolts in accordance with code requirements	6d (2" x 0.113") or 8d (2 1/2 x 0.131"nails and Types S or W drywall screws.	6:12 WSP & 16:16 for GWB	~~465~~ 450	1.80	840

a.The lateral design capacity of braced wall panels is based on full scale wall assembly tests using the minimum restraint provisions of the IRC, further adjusted by the partial restraint/systems effect factor.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In addition to the original reason statements provided in RB308 and RB309 the following should be considered:
SBCRI has completed additional testing and as a result, proposes the modifications shown above. The proposed 350 plf for wood structural panels (WSP's) installed without gypsum is the tested capacity of WSP's in full scale tests as well as in 23' wall assemblies when built to the minimum requirements of the IRC. The stated System Effects factor is simply a factor used to convert the tested capacities to the capacity currently in use in the IRC. It is recognized that the systems effect factor does not exactly result in the stated IRC capacity. The calculated value is rounded to the capacity currently in use. This proposal does not seek to modify what is currently in use. (i.e. the tested capacity, 350 plf times the systems effect factor of 1.8 equals 630 plf. This was rounded down to the 600 plf currently in use.)

When the Ad-Hoc Wall Bracing Committee (AHWBC) first developed these provisions, they did the best that they could, given the testing that was available at the time. Most of the testing that was available came from testing of fully restrained walls. This testing formed the basis of the committees work and judgments were made with regard to the partial restraint of buildings constructed to the IRC as well as the systems effects of completed construction. The table able does not change any of that work, but simply restates the basis of the design capacities using the capacities from tests of buildings constructed in accordance with the minimum IRC and then applying the factor necessary to get back to the current IRC design values.

With regard to the addition of gypsum to braced wall panels: The Ad-Hoc Wall bracing committee used 200 plf as the capacity of the gypsum added to the back side of the braced wall panel. The 200 plf capacity is predicated on the use of nailing at 7" o.c. at the edges of the panel and in the field. **Additionally, the gypsum must be installed vertically (See Table R602.3 (1), Line 37 and footnote "d").** This orientation and fastening pattern is rarely accomplished in the field. The more common fastening is in accordance with the interior coverings section (R702.3.5) which allows both horizontal and vertical applications and screw spacing at 16” o.c. SBCRI tested both of these conditions. The 200 plf capacity of the gypsum is confirmed when installed per the AHWBC assumptions, but only achieves 100 plf when installed with 16:16 screws.

The IRC-Building Committee’s stated two reasons for disapproving RB309 follow. First, the proposal was not limited to wind as stated in testimony. While the limitation was stated in the table, the revision above moves the wind limitation to the title of the table to be clearer as to the application. Second, they stated that design values do not belong in a prescriptive code. However, there are often parts of a building that do not comply with the IRC and that must be designed. Currently, the only direction a building designer has to obtain design values to use engineering based reference documents such as SDPWS which provide design capacities based on fully restrained conditions. This proposal simply gives the building designer an accurate assessment of the design capacities currently provided for in the IRC using the minimum IRC construction as the basis of the capacity.

RB308-13

Final Action: AS AM AMPC____ D

RB310-13
Table R602.10.5

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH[a] (in.)					CONTRIBUTING LENGTH (in.)
		WALL HEIGHT					
		8 ft	9 ft	10 ft	11 ft	12 ft	
CS-PF	SDC A, B and C	16	18	20	22[e]	24[e]	1.5 x Actual[b]
	SDC D_0, D_1 and D_2	16	18	20	22[e]	24[e]	Actual[b]

(Portions of Table not shown remain unchanged)

Reason: Currently Method PFG (Portal Frame at Garage) is permitted in the 2012 IRC Table R602.10.5 with a 1.5 multiplier to convert the leg length to a length contributing to bracing. The multiplier was permitted because Method PFG was restricted for use in areas of low seismicity (SDCs A, B and C).

Cyclic testing conducted at APA in 2006 of the CS-PF (Continuous Sheathed – Portal Frame) showed that the CS-PF has a design strength at least as high as the PFG tested in a similar manner. Based on the results of this testing it is reasonable to permit the same multiplier to be applied to the Method CS-PF when similarly restricted to areas of low seismicity as is Method PFG.

Please note that the CS-PF portal frame can have a leg length as small at 16 inches, where the PFG has a minimum leg length of 24 inches. What makes the CS-PF perform as well or better than the PFG, even with a shorter leg length, is the fact that the CS-PF has nearly twice as many fasteners as the PFG. It is the fastener interaction between the framing and sheathing that determine the ultimate capacity of this wood-structural-panel/framing bracing system.

Note that the IRC bracing provisions are difficult to meet in many cases as a result of narrow building lots and the aesthetic requirements of modern homes. Areas around garages and picture windows are especially difficult to accommodate and still meet the minimum bracing requirements of the code. Permitting the equal-to-stronger minimum 16-inch CS-PF the same multiplier as the 24-inch PFG is both rational and extremely helpful in making the 2012 IRC bracing provisions viable.

We ask the committee to extend the same multiplier to the 16-inch CS-PF that is applied to the 24-inch PFG when the same use restrictions are applied. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216.

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

R602.10.5T-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. Also, it provides a useful option for using method CS-PF in low seismic areas.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Randall Shackelford, P.E., Simpson Strong-Tie Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH [a] (in.) WALL HEIGHT					CONTRIBUTING LENGTH (in.)
		8 ft	9 ft	10 ft	11 ft	12 ft	
CS-PF	~~SDC A, B, and C~~	~~16~~	~~18~~	~~20~~	~~22~~	~~24~~	~~1.5 × Actual [b]~~
	~~SDC D_0, D_1, and D_2~~	16	18	20	22	24	Actual [b<u>, c</u>]

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.
NP = Not Permitted.
a. Linear interpolation shall be permitted.
b. Use the actual length when it is greater than or equal to the minimum length.
<u>c. In SDC A, B, or C, where Method CS-PF is installed on a concrete foundation, supporting a roof or one story and a roof, and on either side of a garage, the contributing length shall be 1.5 times the actual length.</u>
~~c~~ <u>d</u>. Maximum header height for PFH is 10 feet in accordance with Figure R602.10.6.2, but wall height may be increased to 12 feet with pony wall.
~~d~~ <u>e</u>. Maximum opening height for PFG is 10 feet in accordance with Figure R602.10.6.3, but wall height may be increased to 12 feet with pony wall.
~~e~~ <u>f</u>. Maximum opening height for CS-PF is 10 feet in accordance with Figure R602.10.6.4, but wall height may be increased to 12 feet with pony wall.

Commenter's Reason: The purpose of this Public Comment is to allow the CS-PF bracing method to count for 1.5 times its width, as method PFG does, when the exact same limitations are used.

The original proponent's reason statement ended with the following: "We ask the committee to extend the same multiplier to the 16-inch CS-PF that is applied to the 24-inch PFG <u>when the same use restrictions are applied</u>. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216." (*Emphasis by proponent*).

However, the same use restrictions do not apply to the CS-PF as the PFG.
Besides being limited to Seismic Design Category A, B, and C, the PFG is also required to be installed on a concrete foundation, be on either side of a garage opening, and be supporting a roof only or one story and a roof.

The CS-PF can be installed on the first of three stories, on a second or third story, at any wall opening, and with up to 4 portal frames on a braced wall line.

Although the original proposal looked fairly simple, the end result is that the CS-PF will have a 50% increase in capacity, which is significant. But the proponent submitted absolutely no data as evidence to justify this 50% increase. The two tests referenced are not available anywhere that I could find. So our first thought was to argue for denial of this proposal.

But we heard the members testify at the Committee Action Hearing that they needed this increase at garage openings to help houses meet the 2012 bracing amounts.

So this Public Comment will allow the 50% increase in capacity, but only when the CS-PF has the same limitations as Method PFG, just as the proponent asked.

RB310-13
Final Action: AS AM AMPC____ D

RB320-13
R602.10.8.2(3)

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

Add detail as shown below to Figure R602.10.8.2(3): (Remainder unchanged)

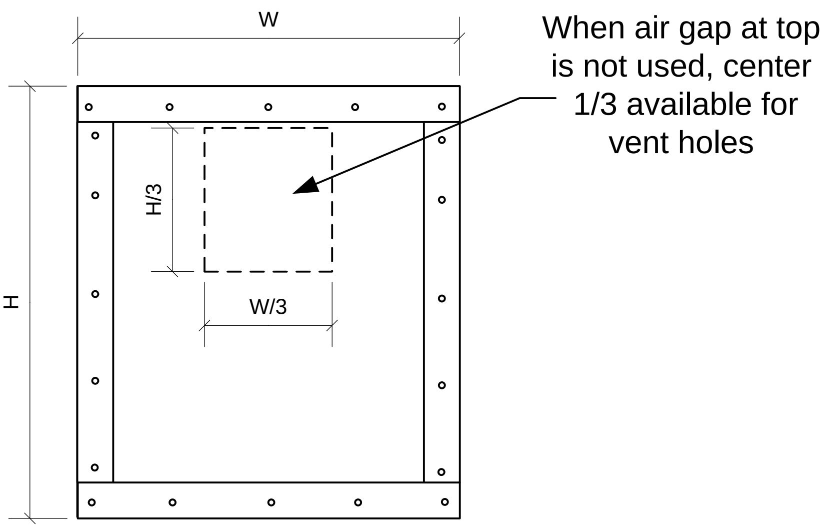


FIGURE R602.10.8.2(3)
BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

Reason: When the air gap is not desired, as in the case of an engineered roof system, the ventilation requirements can be met by placing an opening in the fabricated blocking panels. An opening sized as shown above will not compromise the ability of the fabricated blocking panel to resist overturning or transfer shear from the roof diaphragm to the wall below.

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

R602.10.8.2(3)F-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. Also, provides missing information on how to deal with ventilation.

Assembly Action: **None**

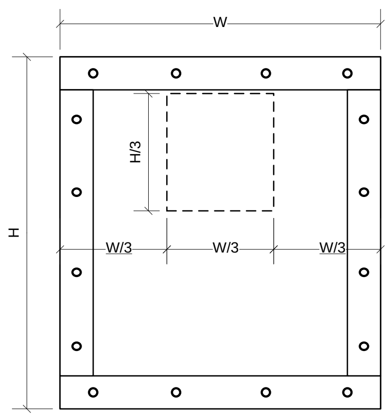
Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:



~~When~~ Where air gap at top is not used, center ~~1/3~~ W/3 available for vent holes

FIGURE R602.10.8.2(3)
BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

Commenter's Reason: While the original proposal was recommended for approval as submitted, a number of minor editorial improvements were recommended be attendees at the mid-year meeting. The minor changes are:

- The addition of "W/3" to either side of the opening.
- Changing "When" to "Where" in the annotation.
- Changing "1/3" to "W/3" in the annotation.

This public comment makes these editorial improvements, making the code easier to understand, administer and use.

RB320-13

Final Action:	AS	AM	AMPC____	D

RB324-13
R602.12, Table R602.12.4

Proposed Change as Submitted

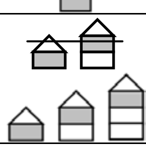
Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)

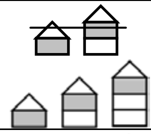
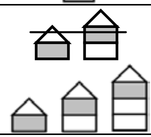
Revise as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed below shall be permitted to be braced in accordance with this section as an alternate to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than ~~two~~ three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of $^1/_2$ inches (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic wind speed is less than or equal to ~~90~~ 100 mph (~~40~~ 44 m/s), and the Exposure Category is A or B.
7. The structure shall be located in Seismic Design Category of A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in ~~two~~three-story buildings.

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

WIND SPEED	STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE [a,b]						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE [a,b]					
			Length of short side (ft) [c]						Length of long side (ft) [c]					
			10	20	30	40	50	60	10	20	30	40	50	60
90		10	1	2	2	2	3	3	1	2	2	2	3	3
			2	3	3	4	5	6	2	3	3	4	5	6
			2	3	4	6	7	8	2	3	4	6	7	8
		15	1	2	3	3	4	4	1	2	3	3	4	4
			2	3	4	5	6	7	2	3	4	5	6	7
			2	4	5	6	7	9	2	4	5	6	7	9

WIND SPEED	STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE [a,b]						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE [a,b]					
			Length of short side (ft) [c]						Length of long side (ft) [c]					
			10	20	30	40	50	60	10	20	30	40	50	60
100		10	1	2	2	3	3	4	1	2	2	3	3	4
			2	3	4	5	6	7	2	3	4	5	6	7
			2	4	5	7	8	10	2	4	5	7	8	10
		15	2	3	3	4	4	6	2	3	3	4	4	6
			3	4	6	7	8	10	3	4	6	7	8	10
			3	6	7	10	11	13	3	6	7	10	11	13

For SI: 1 ft = 304.8 mm

a. Interpolation shall not be permitted.

b. Cripple walls or wood-framed basement walls in a walk-out condition of a one-story structure shall be designed as the first floor of a two-story house.

c. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

Reason: Using the wall bracing values for wind speed of 100 mph and three stories from Section R602.10, the use of Simplified Wall Bracing can be expanded to a wide range of areas and building types without impacting safety. Since the 90 mph values in Table R602.12.4 were calculated from R602.10, then the 100 mph will create an accurate bracing amounts as it would if calculated from the wind tables of R602.10.

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

R602.12 #3-RB-FOLEY.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

For SI: 1 ft = 304.8 mm

a. Interpolation shall not be permitted.

b. Cripple walls or wood-framed basement walls in a walk-out condition ~~of a one-story structure~~ shall be ~~designed~~ designated as the first ~~floor~~ story ~~of a two-story house~~ and the stories above shall be redesignated as the second and third stories, respectively, and shall be prohibited in a three-story structure..

c. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

Committee Reason: Approval was based upon the proponent's published reason. The modification clarifies where a cripple wall or wood-framed basement wall is considered a story.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brian Foley, P.E. Fairfax County, VA, representing Virginia Building and Code Officials Association and Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of ½ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the ~~basic~~ ultimate design wind speed is less than or equal to 130 ~~100~~ mph (58 m/s) ~~(44 m/s)~~, and the Exposure Category is ~~A,~~ B or C.
7. The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in three-story buildings.

(Portions of code change proposal not show remain unchanged)

Commenter's Reason: The purpose of this public comment is to correlate RB324 with the comprehensive update of the IRC wind provisions to the ultimate design wind speed basis of ASCE 7-10 and the 2012 IBC. RB324 increased the scope of the simplified wall bracing method from 90mph to 100mph, but those wind speeds reflect the old ASCE 7-05 basis (now the "nominal design wind speed" or V_{ASD}). This code change converts the limit from 100mph V_{ASD} to the equivalent 130mph V_{ULT}.

RB324-13

Final Action: AS AM AMPC____ D

RB327-13
R602.12.6.2

Proposed Change as Submitted

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.12.6.2 Method CS-PF *Braced wall panels* constructed as Method CS-PF in accordance with Section R602.10.6.4 shall be permitted when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-PF panel shall equal ~~0.5~~ 0.75 bracing units. A maximum of four CS-PF panels shall be permitted on all segments of walls parallel to each side of the circumscribed rectangle. Segments of walls which include a Method CS-PF panel shall meet the requirements of Section R602.10.4.2.

Reason: Currently each Method PFG (Portal Frame at Garage) is permitted in the 2012 IRC Section R602.12.6.3 to contributing 0.75 bracing units to the required amount of bracing. The contribution amount is based on the 1.5 multiplier to the length of the vertical leg of the portal frame permitted in Table R602.10.5. This multiplier was added in the "legacy" IRC provisions because Method PFG was restricted for use in areas of low seismicity (SDCs A, B and C).

Cyclic testing conducted at APA in 2006 of the CS-PF (Continuous Sheathed – Portal Frame) showed that the CS-PF has a design strength at least as high as the PFG tested in a similar manner. Based on the results of this testing it is reasonable to permit the same contributing amount of bracing units for the Method CS-PF when similarly restricted to areas of low seismicity as is the Simplified Method.

Please note that the CS-PF portal frame can have a leg length as small at 16 inches, where the PFG has a minimum leg length of 24 inches. What makes the CS-PF perform as well or better than the PFG, even with a shorter leg length, is the fact that the CS-PF has nearly twice as many fasteners as the PFG. It is the fastener interaction between the framing and sheathing that determine the ultimate capacity of this wood-structural-panel/framing bracing system.

Note that the IRC bracing provisions are difficult to meet in many cases as a result of narrow lot widths and the aesthetic requirements of modern homes. Areas around garages and picture windows are especially difficult to accommodate and still meet the minimum bracing requirements of the code. Permitting the equal-to-stronger minimum 16-inch CS-PF the to have the same adjustment factor as the 24-inch PFG is both rational and extremely helpful in broadening the scope of the 2012 IRC Simplified Bracing provisions.

We ask the committee to permit the 16-inch CS-PF the same 0.75 bracing unit contribution as is applied to the 24-inch PFG when used in the Simplified Bracing Method. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216.

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

R602.12.6.2-RB-KEITH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Based upon the committee's previous action on RB310-13 and the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Randall Shackelford, P.E., Simpson Strong-Tie Company, requests Disapproval.

Commenter's Reason: We ask that the membership deny RB327 for the following reasons:

1. This is a 50 percent increase in capacity requested with absolutely no technical substantiation submitted. The referenced test reports are no longer available anywhere that I could find.
2. In the simplified method, the CS-PF *ALREADY* counts for 1.5 times its width. The CS-PF counts for 0.5 bracing units, or one half of a braced wall panel. The CS-PF is 16" wide, increase that by 50% and you get 24" wide, which is exactly half a braced wall panel. So this is a completely different issue than RB310. This is double dipping. Asking for a 50% increase on top of an already existing 50% increase.
3. Even if RB310 is approved, that proposal does NOT say that the CS-PF should count for exactly the same length as the PFG method. It says that they both should count for 1.5 times their width. The PFG is 24" wide, times 1.5 equals 36" or 0.75 of a bracing unit, which is what the code says. The CS-PF is 16" wide, times 1.5 equals 24", which is 0.5 of a bracing unit, which is what the code says. So the code already treats the CS-PF and PFG exactly the same by counting them as 1.5 times their width.
4. The proponent's reason states that "it is reasonable to permit the same contributing amount of bracing units for the Method CS-PF <u>when similarly restricted to areas of low seismicity</u> as is the Simplified Method." However, the proponent mentions nothing of the other code limitations that apply to Method PFG, such as the requirements that the portal be installed on a concrete foundation, at garage openings only, and only where supporting a roof or one story and a roof.

Therefore this proposal is not needed.

RB327-13

Final Action: AS AM AMPC____ D

RB329-13
R602.10 (NEW), R602.11, R602.12, Appendix R (NEW)

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee/American Chemistry Council (jcrandell@aresconsulting.biz); Larry Wainright, Structural Building Components Association; Paul Lautrup, OX Engineered Products

Revise as follows:

APPENDIX R
WALL BRACING SUPPLEMENTAL PROVISIONS

~~R602.10~~ AR602.10 Wall bracing.

~~R602.10.~~1 AR602.10.1 Braced wall lines.

~~R602.10.1.1~~ AR602.10.1.1 Length of a braced wall line.

FIGURE ~~R602.10.1.1~~ AR602.10.1.1 BRACED WALL LINES

~~R602.10.1.2~~ AR602.10.1.2 Offsets along a braced wall line.

~~R602.10.1.3~~ AR602.10.1.3 Spacing of braced wall lines.

TABLE ~~R602.10.1.3~~ AR602.10.1.3 BRACED WALL LINE SPACING

~~R602.10.1.~~4 AR602.10.1.4 Angled walls.

FIGURE ~~R602.10.1.~~4 AR602.10.1.4 ANGLED WALLS

~~R602.10.2~~ AR602.10.2 Braced wall panels.

~~R602.10.2.~~1 AR602.10.2.1 Braced wall panel uplift load path.

~~R602.10.2.2~~ AR602.10.2.2 Locations of braced wall panels.

FIGURE ~~R602.10.2.2~~ AR602.10.2.2 LOCATION OF BRACED WALL PANELS

~~R602.10.2.2.1~~ AR602.10.2.2.1 Location of braced wall panels in Seismic Design Categories D_0, D_1 and D_2.

~~R602.10.2.3~~ AR602.10.2.3 Minimum number of braced wall panels.

~~R602.10.3~~ AR602.10.3 Required length of bracing.

TABLE ~~R602.10.3(1)~~ AR602.10.3(1) BRACING REQUIREMENTS BASED ON WIND SPEED

TABLE ~~R602.10.3(2)~~ AR602.10.3(2) WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

TABLE ~~R602.10.3(3)~~ AR602.10.3(3) BRACOMG REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

TABLE ~~R602.10.3(4)~~ AR602.10.3(4) SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

~~R602.10.4~~ AR602.10.4 Construction methods for braced wall panels.

TABLE ~~R602.10.4~~ AR602.10.4 BRACING METHODS

~~R602.10.4.1~~ AR602.10.4.1 Mixing methods.

~~R602.10.4.2~~ AR602.10.4.2 Continuous sheathing methods.

~~R602.10.4.3~~ AR602.10.4.3 Braced wall panel interior finish material.

~~R602.10.5~~ AR602.10.5 Minimum length of a braced wall panel.

TABLE ~~R602.10.5~~ AR602.10.5 MINIMUM LENGTH OF BRACED WALL PANELS

FIGURE ~~R602.10.5~~ AR602.10.5 BRACED WALL PANELS WITH CONTINUOUS SHEATHING

~~R602.10.5.1~~ AR602.10.5.1 Contributing length.

~~R602.10.5.2~~ AR602.10.5.2 Partial credit.

TABLE ~~R602.10.5.2~~ AR602.10.5.2 PARTIAL CREDIT FOR BRACED WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH

~~R602.10.6~~ AR602.10.6 Construction of Methods ABW, PFH, PFG, CS-PF and BV-WSP.

~~R602.10.6.1~~ AR602.10.6.1 Method ABW: Alternate braced wall panels.

TABLE ~~R602.10.6.1~~ AR602.10.6.1 MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS

FIGURE ~~R602.10.6.1~~ AR602.10.6.1 METHOD ABW-ALTERNATE BRACED WALL PANEL

~~R602.10.6.2~~ AR602.10.6.2 Method PFH: Portal frame with hold-downs.

FIGURE ~~R602.10.6.2~~ AR602.10.6.2 METHOD PFH-PORTAL FRAME WITH HOLD-DOWNS

~~R602.10.6.3~~ AR602.10.6.3 Method PFG: Portal frame at garage door openings in Seismic Design Categories A, B and C.

FIGURE ~~R602.10.6.3~~ AR602.10.6.3 METHOD PFG-PORTAL FRAME AT GARAGE DOOR OPENINGS IN SEISMIC DESIGN CATEGORIES A, B AND C

~~R602.10.6.4~~ AR602.10.6.4 Method CS-PF: Continuously sheathed portal frame.

FIGURE ~~R602.10.6.4~~ AR602.10.6.4 METHOD CS-PF-CONTINUOUSLY SHEATHED PORTAL FRAME PANEL CONSTRUCTION

TABLE ~~R602.10.6.4~~ AR602.10.6.4 TENSION STRAP CAPACITY REQURIED FOR RESISTING WIND PRESURES PERPENDICULAR TO METHOD PFH, PFG AND CS-PF BRACED WALL PANELS

~~R602.10.6.5~~ AR602.10.6.5 Wall bracing for dwellings with stone and masonry veneer in Seismic Design Categories D_0, D_1 and D_2.

TABLE ~~R602.10.6.5~~ AR602.10.6.5 METHOD BV-WSP WALL BRACING REQURIEMENTS

FIGURE ~~R602.10.6.5~~ AR602.10.6.5 METHOD BV-WSP-WALL BRACING FOR DWELLINGS WITH STONE AND MASONRY VENEER IN SEISMIC DESIGN CATEGORIES D_0. D_1, AND D_2

~~R602.10.6.5.1~~ AR602.10.6.5.1 Length of bracing.

~~R602.10.7~~ AR602.10.7 Ends of braced wall lines with continuous sheathing.

FIGURE ~~R602.10.7~~ AR602.10.7 END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING

~~R602.10.8~~ AR602.10.8 Braced wall panel connections.

FIGURE ~~R602.10.8(1)~~ AR602.10.8(1) BRACED WALL PANEL CONNECTION WHEN PERPENDICULAR TO FLOOR/CEILING FRAMING

FIGURE ~~R602.10.8(2)~~ AR602.10.8(2) BRACED WALL PANEL CONNECTION WHEN PARALLEL TO FLOOR/CEILING FRAMING

~~R602.10.8.1~~ AR602.10.8.1 Braced wall panel connections for Seismic Design Categories D_0, D_1 and D_2.

~~R602.10.8.2~~ AR602.10.8.2 Connections to roof framing.

FIGURE ~~R602.10.8.2(1)~~ AR602.10.8.2(1) BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS

FIGURE ~~R602.10.8.2(2)~~ AR602.10.8.2(2) BRACED WALL PANEL CONNCECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

FIGURE ~~R602.10.8.2(3)~~ AR602.10.8.2(3) BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

~~R602.10.9~~ AR602.10.9 Braced wall panel support.

FIGURE ~~R602.10.9~~ AR602.10.9 MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

~~R602.10.9.1~~ AR602.10.9.1 Braced wall panel support for Seismic Design Category D_2.

~~R602.10.10~~ AR602.10.10 Panel joints.

~~R602.10.11~~ AR602.10.11 Cripple wall bracing.

~~R602.10.11.1~~ AR602.10.11.1 Cripple wall bracing for Seismic Design Categories D_0 and D_1 and townhouses in Seismic Design Category C.

~~R602.10.11.2~~ AR602.10.11.2 Cripple wall bracing for Seismic Design Category D_2.

~~R602.10.11.3~~ AR602.10.11.3 Redesignation of cripple walls.

~~R602.11~~ AR602.11 Wall anchorage.

~~R602.11.1~~ AR602.11.1 Wall anchorage for all buildings in Seismic Design Categories D_0, D_1 and D_2 and townhouses in Seismic Design Category C.

~~R602.11.2~~ AR602.11.2 Stepped foundations in Seismic Design Categories D_0, D_1 and D_2.

R602.10 Wall bracing. Buildings, and portions thereof, shall be braced in accordance with one or more of the following sections using bracing materials and methods complying with Section R602.10.1 and load path detailing in accordance with Section R602.10.5:

1. Intermittent bracing per Section R602.10.2,
2. Continuous sheathing per Section R602.10.3,
3. Engineered design per Section R602.10.4, or
4. Appendix R – Wall Bracing Supplemental Provisions

Where a building, or portion thereof, does not comply with Section R602.10.2, Section R602.10.3, or Section R602.10.5, those portions shall be designed and constructed in accordance with Section R602.10.4. Townhouses in Seismic Design Category C and all buildings in Seismic Design Categories D_0, D_1, and D_2 shall comply with the bracing requirements in Appendix R or be designed in accordance with Section R602.10.4.

R602.10.1 Bracing materials and methods. Wall bracing materials and methods shall comply with Table R602.10.1.

TABLE R602.10.1
BRACING METHODS[a,b]

Method	Minimum Brace Material Thickness or Size	Minimum Braced Wall Panel Width or Brace Angle	Connection Criteria: Minimum Fasteners	Connection Criteria: Maximum Spacing
LIB Let-in Bracing	1x4 wood brace (or approved metal brace installed per manufacturer instructions)	45^o angle and maximum 16"oc stud spacing[c]	2-8d common nails or 3-8d box nails (2-1/2" long x 0.113" dia.)	Per stud and top and bottom plates
DWB Diagonal wood boards	¾" (1" nominal)	48"	2-8d box nails (2-1/2" long x 0.113" diameter) or 2 – 1-3/4" long 16ga. staples	Per stud and top and bottom plates
WSP Wood structural panel	3/8"	48"[d]	6d common nail or 8d box nail (2-1/2" long x 0.113" diameter)	6" edges, 12" field
SFB Structural Fiberboard Sheathing	½"	48"[d]	1-1/2" long x 0.120" dia. galvanized roofing nails	3" edges, 6" field
GB Gypsum Board (installed on both sides of wall)	½"	96" (48" for use with Section R602.10.3)	5d cooler nails or #6 screws	7" edges, 7" field (including top and bottom plates)
PCP Portland cement	¾" (maximum	48"	1-1/2" long, 11 gage, 7/16"	6" o.c. on all framing

plaster	16"oc stud spacing)		diameter head nails or 7/8" long, 16 gage staples	members
CS-WSP[e] Continuously sheathed WSP	3/8"	Refer to Table R602.10.1.1	Same as WSP	Same as WSP
CS-SFB[e] Continuously sheathed SFB	½"		Same as SFB	Same as SFB
PF Portal Frame[f]	7/16"	See Figure R602.10.1	See Figure R602.10.1	See Figure R602.10.1

For SI: 1 inch = 25.4 mm

a. Alternative bracing materials and methods, when approved in accordance with Section R104.11, shall be permitted to be used as a substitute for any of the bracing materials listed in Table R602.10.1 provided at least equivalent performance is demonstrated. Where the tested bracing strength or stiffness differs from tabulated materials, the bracing amount required for the alternative material shall be permitted to be factored to achieve equivalence.

b. All edges of panel-type wall bracing shall be attached to framing or blocking, except GB bracing horizontal joints shall not be required to be blocked where joints are finished.

c. Method LIB shall not be permitted for walls supporting a roof and two stories. Two LIB braces installed at a 60^{o} angle shall be permitted to be substituted for each 45^{o} angle LIB brace.

d. A braced wall panel shall be permitted to be reduced to a 32-inch length when studs at each end of the braced wall panel are anchored to foundation or framing below using hold-down device with minimum 2,800 lbs design tension capacity. For detached single story garages and attached garages supporting roof only, a minimum 24-inch brace panel length shall be permitted on one wall containing one or more garage door openings.

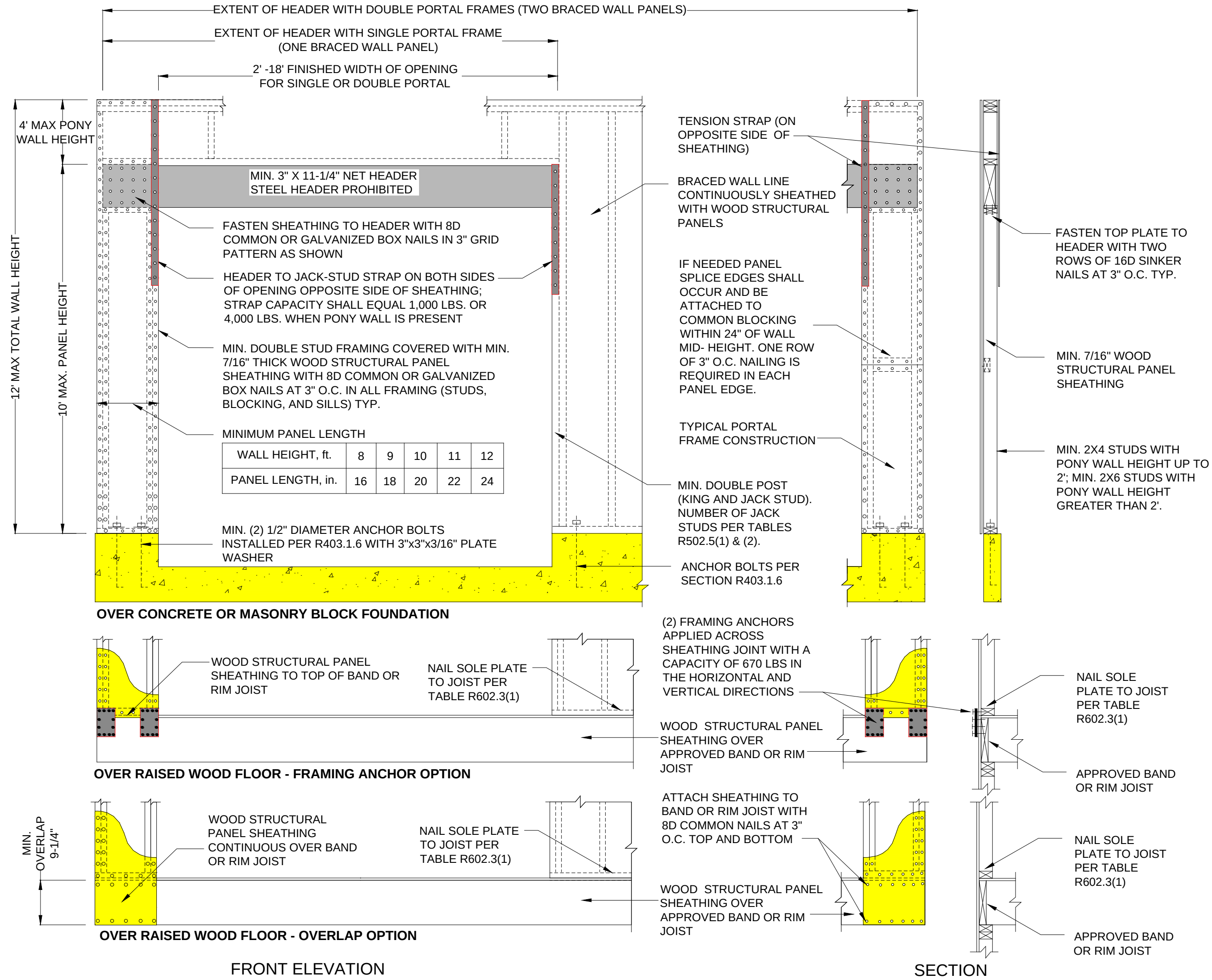
e. Bracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.

f. For purposes of bracing in accordance with Section R602.10.2, two Method PF brace panels having a minimum width of 24-inches each shall be considered equivalent to one braced wall panel.

TABLE R602.10.1.1
MINIMUM WIDTHS OF METHOD CS-WSP AND CS-SFB BRACED WALL PANELS

Maximum Opening Height Adjacent to Braced Wall Panel	**Minimum Length of Braced Wall Panel (inches)**			
	8' tall wall	**9' tall wall**	**10' tall wall**	**12' tall wall**
Up to 5' – 4"	24	27	30	36
Up to 6' – 8"	32	30	30	36
Up to 8'	48	41	38	36
Up to 9'	-	54	46	41
Up to 10'	-	-	60	48
Up to 12'	-	-	-	72

For SI: 1 foot = 305 mm, 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 lb = 4.45 N

NOTE: Minimum PF panel length shall be 24 inches (610 mm) for use with Section R602.10.2.

FIGURE R602.10.1

METHOD PF – PORTAL FRAME CONSTRUCTION

602.10.2. Intermittent Bracing. Intermittent bracing shall comply with Sections R602.10.2.1 and R602.10.2.2.

R602.10.2.1 Limitations. The intermittent bracing requirements of Section R602.10.2.2 shall be limited to the following conditions of use:

1. Basic design wind speed shall not exceed 100 mph (161 km/h).
2. Bracing methods shall be LIB, DWB, WSP, SFB, GB, PCP, and PF in accordance with Table R602.10.1.
3. Overall plan length of the house is limited to 75 feet (22.9 m) and the overall plan width shall be no less than one-third the overall plan length.
4. Wall height at each story level shall not exceed 10 feet (3.05 m).
5. Roof eave-to-ridge height shall not exceed 10 feet (3.05 m) unless the roof is considered as an additional story for the purpose of determining bracing amounts required.
6. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5.
7. Floors supporting brace panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
8. Townhouses shall be stabilized independently of adjacent units unless a design is provided to permit lateral load transfer between adjacent units.

R602.10.2.2 Requirements. Braced wall panels shall be constructed of bracing methods, materials, and minimum braced panel lengths complying with Table R602.10.1. The number of braced wall panels required for each side of a building (elevation view) at each story level of the building shall comply with Table R602.10.2 and shall be oriented parallel to the building side. The following additional requirements shall apply:

1. In no case shall the amount of bracing be less than two braced wall panels on exterior walls comprising each side of a building (elevation view) for each story level of the building.
2. Braced wall panel shall be located on each building side at each story level in accordance with Figure R602.10.2.2.
3. No more than one-half the number of braced wall panels required on a building side shall be permitted to be relocated from exterior walls to interior walls oriented in the same plan direction and within one-half the floor plan dimension perpendicular to the exterior wall.
4. Use of multiple bracing methods and materials complying with Table R602.10.1 shall be permitted.
5. Houses with skewed wings shall be constructed in accordance with either Section R602.10.3 or designed in accordance with Section R602.10.4.
6. Garage door openings supporting a floor load above shall be braced using Method PF unless the building plan level containing the garage opening wall complies with all the bracing requirements of this section.
7. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

TABLE R602.10.2
NUMBER OF BRACED WALL PANELS REQUIRED
FOR EACH HOUSE ELEVATION (BUILDING SIDE) AT EACH STORY LEVEL[1]

Wind Velocity	Story Level Supporting:	Longest Overall Dimension of Floor Plan for a Given Story Level		
		25'	50'	75'
90 mph	Roof Only	1	2	3
	Roof + 1 Story	2	4	6
	Roof + 2 Stories	3	6	9
100 mph	Roof Only	2	3	4
	Roof + 1 Story	3	5	8
	Roof + 2 Stories	4	8	11

For SI: 1 foot = 305 mm
a. Interpolation between dimensions shall be permitted. Extrapolation is prohibited.
b. Table applies to wind exposure B. For wind exposure C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively.
c. Fractions of panels shall be rounded to the nearest one-half braced wall panel. The following braced wall panel conditions shall be permitted to be counted as one-half a braced wall panel: (1) one 60 degree LIB, (2) one 48" GB or one 96" GB with gypsum wall board on one side, or (3) one 36" WSP, SFB, or PCP braced wall panel for wall heights not more than 9 feet (2.75 m).

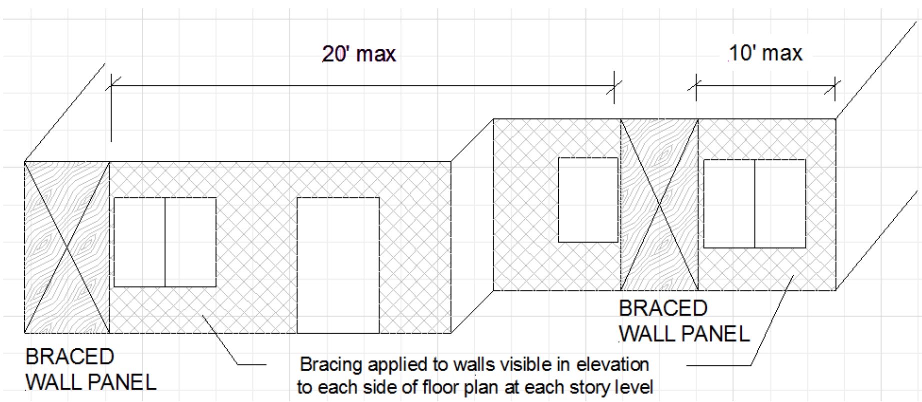


FIGURE R602.10.2.2
LOCATION OF BRACED WALL PANELS

R602.10.3 Continuous Sheathing.

R602.10.3.1 Limitations. The continuous sheathing requirements of Section R602.10.3 shall be limited to bracing methods CS-WSP and CS-SFB in accordance with Table R602.10.1 with the following conditions of use:

1. Basic design wind speed shall not exceed 110 mph (177 km/h).
2. Wall height at each story level shall not exceed 12 feet (3.66 m).
3. Eave to ridge height shall not exceed 20 feet (6.10 m).
4. Exterior walls shall be sheathed on all sheathable surfaces including infill areas between braced wall panels, above and below wall openings and on gable end walls.
5. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5.
6. Floors supporting braced wall panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
7. Townhouses shall be stabilized independently of adjacent units, unless a design is provided to permit lateral load transfer between adjacent units.

R602.10.3.2 Requirements. The required length of bracing for each side of a building (plan elevation) at each story level shall be determined using Table R602.10.3 and Figure R602.10.3(1). The cumulative contributing length of braced wall panels assigned to a rectangle side and each complying with Table R602.10.1.1 shall be greater than or equal to the required length of bracing. The following additional requirements shall apply:

1. Braced wall panels on exterior or interior walls shall be assigned to the nearest rectangle side as shown in Figure R602.10.3(2) for each story level floor plan.
2. Braced wall panels shall be distributed and installed in accordance with Figure R602.10.3(3).
3. A minimum of one-half the required bracing amount for each rectangle side should be located on exterior walls within 8 feet of the location of the rectangle side.
4. Interior braced wall panels using Method GB shall be assigned to the closest parallel rectangle side and shall contribute 0.5 times their actual length.
5. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

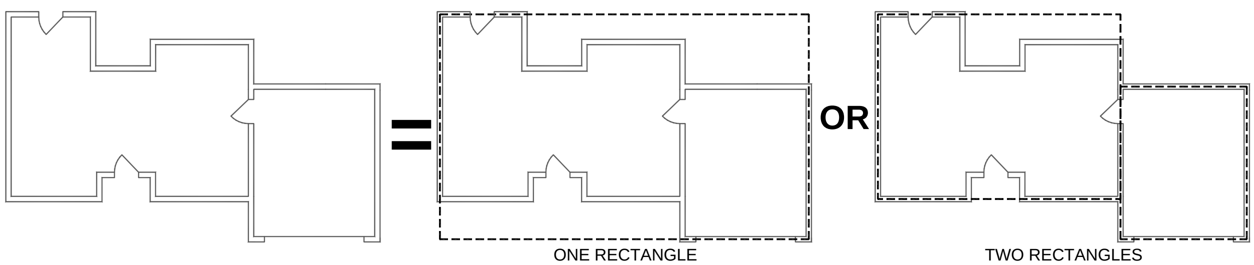


FIGURE R602.10.3(1)
CIRCUMSCRIBED RECTANGLES[a,b,c]

a. Each floor plan level shall be circumscribed with one or more rectangles around the entire floor plan at the floor level under consideration as shown in Figure R602.10.3.
b. Rectangles shall surround all enclosed offsets and projections such as sunrooms and attached garages for a given story level floor plan. Chimneys, partial height projections, and open structures, such as carports and decks, shall be excluded from the rectangle.
c. Each rectangle shall have no side greater than 80 feet (24.4 m) with a maximum rectangle length-to-width ratio of 3:1. Rectangles shall be permitted to be skewed to accommodate diagonal walls.

TABLE R602.10.3
REQUIRED LENGTH OF BRACING ALONG EACH SIDE OF A CIRCUMSCRIBED RECTANGLE [a,b,c,d]

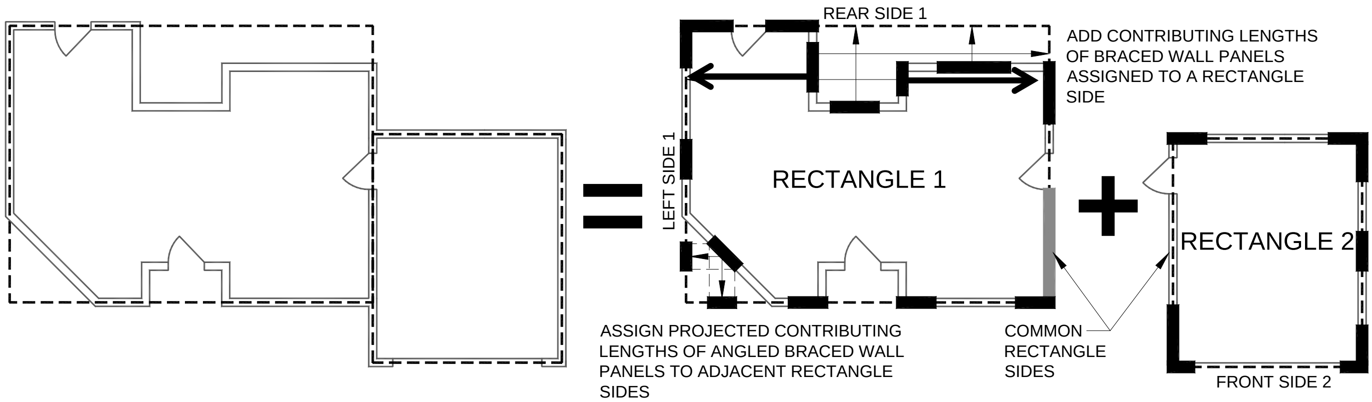
WIND SPEED	EAVE-TO RIDGE HEIGHT (FEET)	NUMBER OF LEVELS ABOVE [e]	REQUIRED LENGTH (FEET) OF BRACING ON ANYSIDE OF RECTANGLE — Length of perpendicular side (ft)[f]: 10	20	30	40	50	60	70	80
90	10	None	2.0	3.5	5.0	6.0	7.5	9.0	10.5	12.0
		One story	3.5	6.5	9.0	12.0	14.5	17.0	19.8	22.6
		Two stories	5.0	9.5	13.5	17.5	21.5	25.5	29.2	33.4
	15	None	2.6	4.6	6.5	7.8	9.8	11.7	13.7	15.7
		One story	4.0	7.5	10.4	13.8	16.7	19.6	22.9	26.2
		Two stories	5.5	10.5	14.9	19.3	23.7	27.5	32.1	36.7
	20	None	2.9	5.2	7.3	8.8	11.1	13.2	15.4	17.6
		One story	4.5	8.5	11.8	15.6	18.9	22.1	25.8	29.5
		Two stories	6.2	11.9	16.8	21.8	27.3	31.1	36.3	41.5
100	10	None	2.5	4.0	6.0	7.5	9.5	11.0	12.8	14.6
		One story	4.5	8.0	11.0	14.5	18.0	21.0	24.5	28.0
		Two stories	6.0	11.5	16.5	21.5	26.5	31.0	36.2	41.4
	15	None	3.4	5.2	7.8	9.8	12.4	14.3	16.7	19.1
		One story	5.2	9.2	12.7	16.7	20.7	24.2	28.2	32.2
		Two stories	6.6	12.7	18.2	23.7	29.2	34.1	39.8	45.5
	20	None	3.8	5.9	8.8	11.1	14.0	16.2	18.9	21.6
		One story	5.9	10.4	14.4	18.9	23.4	27.3	31.8	36.3
		Two stories	7.5	14.4	20.6	26.8	33.0	38.5	44.9	51.3
110	10	None	3.0	5.0	7.0	9.0	11.5	13.3	15.5	17.5
		One story	5.0	9.5	13.5	17.5	21.5	25.5	29.5	34.0
		Two stories	7.5	14.0	20.0	26.0	32.0	37.5	44.0	50.0
	15	None	4.2	6.3	9.5	11.9	15.0	17.3	20.2	23.1
		One story	6.3	11.2	15.4	20.2	25.0	29.3	34.2	39.1
		Two stories	8.0	15.4	22.0	28.7	35.3	41.3	48.2	55.1
	20	None	4.6	7.2	10.6	13.4	16.9	19.6	22.9	26.2
		One story	7.2	12.6	17.4	22.9	28.3	33.0	38.5	44.0
		Two stories	9.1	17.4	24.9	32.4	39.9	46.6	54.4	62.2

For SI: 1 ft = 304.8 mm

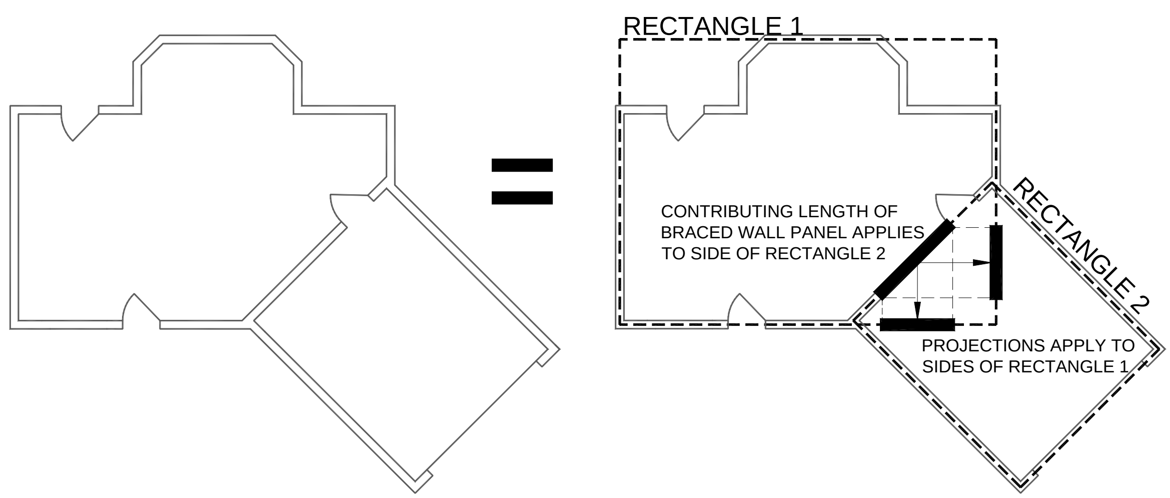
a. Interpolation shall be permitted; extrapolation shall be prohibited.

b. For Exposure Category C or D, multiply the required length of bracing by a factor of 1.3 or 1.6, respectively.

c. For wall heights other than 10 ft (3.05 m), multiply the required length of bracing by the following factors: 0.90 for 8 feet (2.44 m), 0.95 for 9 feet (2.74 m), 1.05 for 11 feet (3.35 m) and 1.10 for 12 feet (3.66 m).
d. Where minimum ½" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.
e. A floor, habitable or otherwise, contained wholly within the roof rafters or roof trusses need not be considered a story for purposes of determining wall bracing provided the eave to ridge height does not exceed 20 feet (6.10 m).
f. Perpendicular sides to the front and rear sides are the left and right sides. Perpendicular sides to the left and right sides are the front and rear sides.



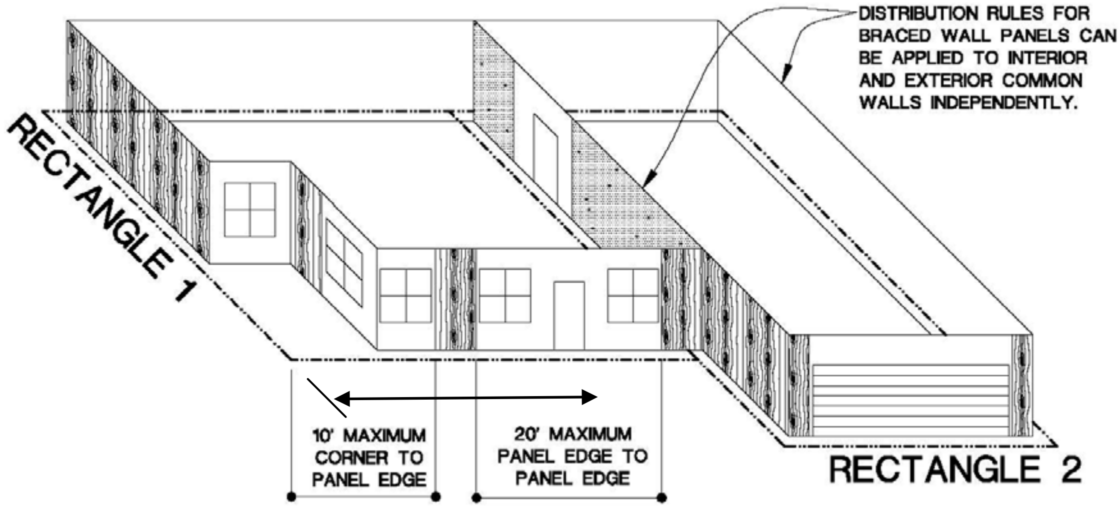
(a) Regular Floor Plan



(b) Skewed Floor Plan

FIGURE R602.10.3(2)
ASSIGNMENT OF BRACED WALL PANELS CIRCUMSCRIBED RECTANGLE SIDES[a,b,c]

a. Projected contributing lengths of angled braced wall panels shall be assigned to the closest rectangle sides.
b. Where multiple rectangles share a common side or sides, as shown in Figure R602.10.3(2)(a), the total required length of bracing on the common side shall equal the sum of the required lengths from each of the shared rectangle sides.
c. Braced wall panels located on a common wall where skewed rectangles intersect, as shown in Figure R602.10.3(2)(b), shall have their contributing length applied towards the required length of bracing for the parallel rectangle side and its projected contributing lengths towards the adjacent skewed rectangle sides. Where the common side of rectangle 2 as shown in Figure R602.10.3(2)(b) has no physical wall, the portion shall be designed in accordance with Section R602.10.4.



For SI: 1 ft = 304.8 mm

FIGURE R602.10.3(3)
DISTRIBUTION OF BRACED WALL PANELS[a,b,c,d]

a. A braced wall panel complying with Table R602.10.1.1 shall be located on each elevation view within 10 feet (3.05 m) of the corners of circumscribed rectangles.
b. The distance between adjacent edges of braced wall panels shall be no more than 20 feet (6.10 m) as measured along the rectangle side.
c. A minimum 24-inch-wide CS-WSP or 32-inch-wide CS-SFB panel shall be located on each side of inside and outside corners or an 800 lb rated tie-down shall be fastened to the edge of the braced wall panel closest to each corner.
d. Interior and exterior wall segments which contribute to the common sides of multiple rectangles shall be permitted to apply the distribution requirements given above to each wall segment independently.

R602.10.4 Wall bracing by engineered design. Designs using bracing materials and methods listed in Table R602.10.1 or approved alternative materials and methods shall be permitted and shall comply with accepted engineering practice. Accepted engineering practice shall include the following:

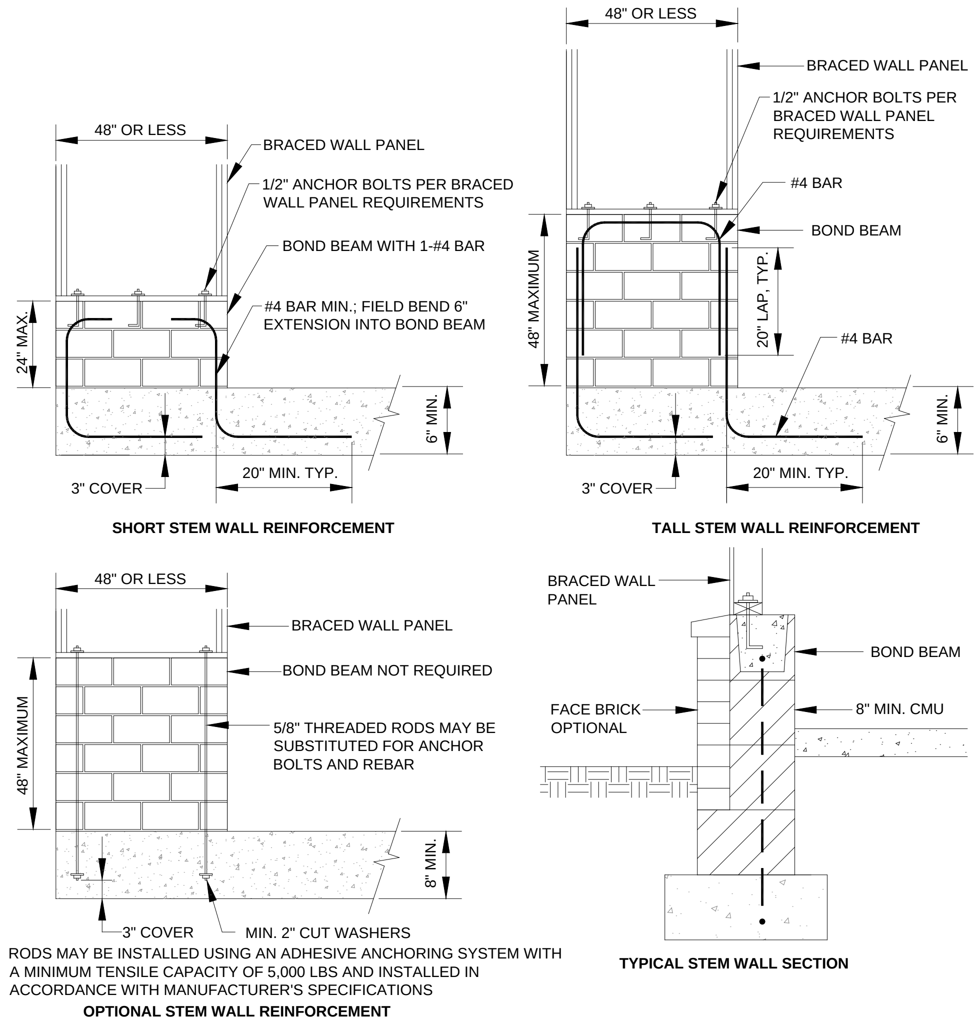
1. Design in accordance with Section R301, or
2. Design equivalent to the analysis basis and scope of the prescriptive provisions of R602.10, including determination of design loads, design unit shear values, and bracing amounts.

R602.10.5 Load path details. Construction shall comply with applicable detailing requirements of this section to ensure an adequate continuous load path for transfer of bracing loads and uplift loads from the roof to the foundation.

R602.10.5.1 Wind uplift load path. Framing connections to transfer roof uplift forces shall comply with Section R602.3.5 and Section R802.11.

R602.10.5.2 Foundation anchorage. Braced wall panels shall be connected to the foundation per Section R403.1.6 and as required in Figure R602.10.1 for portal frames (Method PF).

R602.10.5.3 Masonry or concrete pedestals. Masonry or concrete stem walls with a length of 48 inches (1220 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure R602.10.4.3. Concrete stem walls shall be 6” nominal minimum thickness.



NOTE: GROUT BOND BEAMS AND ALL CELLS WHICH CONTAIN REBAR, THREADED RODS AND ANCHOR BOLTS.

For SI: 1 in=25.4 mm

FIGURE R602.10.5.3
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

R602.10.5.4 Blocking of floor framing. When parallel to floor framing, braced wall panels shall be connected to a band, rim or header joist, floor framing or perpendicular full-height solid blocking between floor framing at 16 inches (406 mm) on center. When perpendicular to floor framing, braced wall panels shall be connected to full-height solid blocking between floor framing. Attachments shall be in accordance with Table R602.3(1). Manufactured lumber or truss blocking panels shall be permitted to substitute for full-height solid blocking.

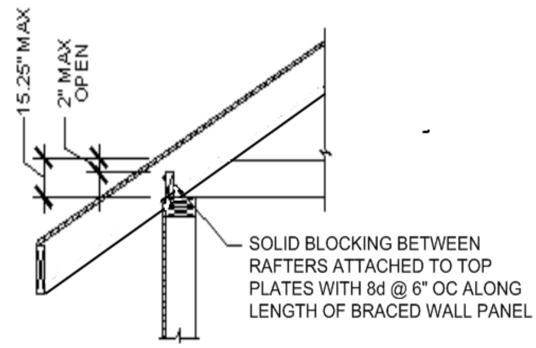
R602.10.5.5 Blocking of roof framing. When parallel to roof framing, braced wall panels shall be connected to a band, rim or header joist, or roof truss. When perpendicular to roof framing, the top plates of exterior braced wall panels shall be connected to the rafters or roof trusses above in accordance with Table R602.10.5.5 and fastened in accordance with Table R602.3(1).

TABLE R602.10.5.5
BRACED WALL PANEL CONNECTIONS TO PERPENDICULAR ROOF FRAMING

DISTANCE FROM TOP OF BRACED WALL PANEL TO TOP OF RAFTER OR ROOF	REQUIREMENT	REFERENCED FIGURE

TRUSS, (in)		
≤ 9.25	No blocking required	NA
9.25 – 15.25	Solid 2x blocking between rafters or trusses	R602.10.5.5(1)
15.25 – 48	Vertical blocking panels	R602.10.5.5(2)
> 48	Designed in accordance with accepted engineering practice	NA

For SI: 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm

FIGURE R602.10.5.5(1)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR TRUSSES

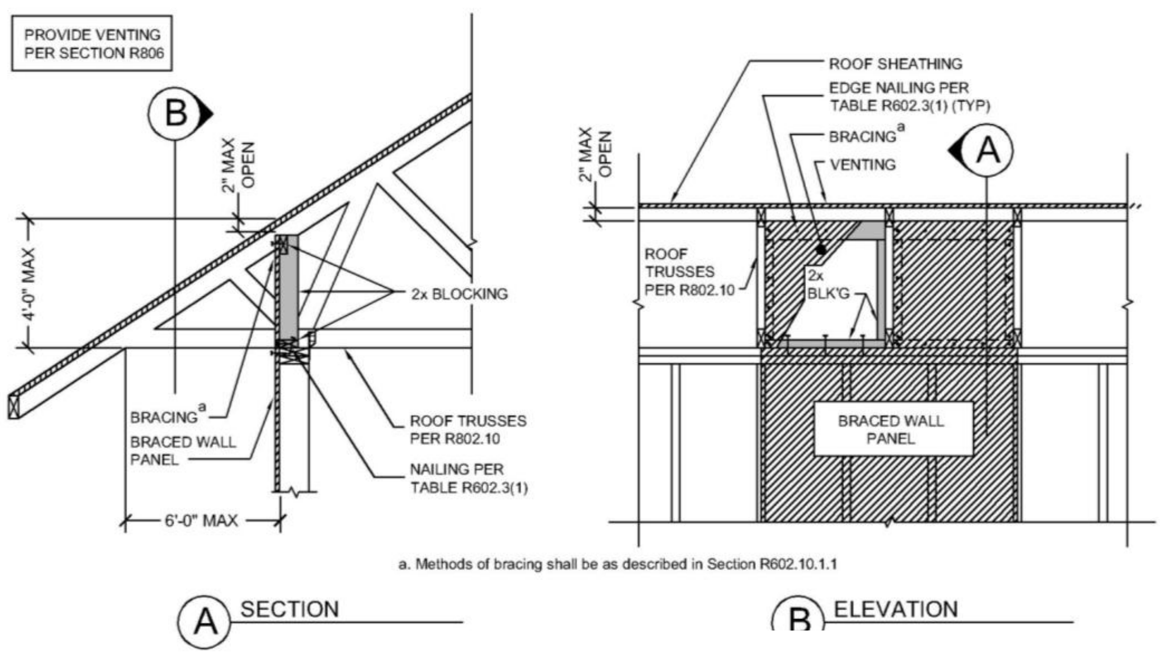


FIGURE R602.10.5.5(2)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

R602.10.5.6 Cripple walls and framed walls of walk-out basements. The required length of bracing for cripple walls with a maximum height of 48 inches (1220 mm) or less along its entire length shall be equal to the wall above. The required length of bracing for cripple walls with a height greater than 48 inches (1220 mm) at any location along its length and for framed walls of a walk-out basement shall be determined in accordance with Section R602.10.2 or R602.10.3, considering the cripple wall or walk-out basement as an additional story. As an alternative, the required length of bracing shall be permitted to equal to the wall above multiplied by a factor of 1.15.

R602.10.5.7 Open Elevated Foundations. Open elevated foundations, such as pile foundations shall be constructed to transfer all lateral loads from the wall bracing system to the piles or elevated piers, including shears, overturning, and uplift loads. Piles or elevated piers along with their foundations shall be sized and/or embedded to transfer all lateral loads imposed by the wall bracing system to the ground.

R602.10.5.8 Balloon frame wall bracing. Balloon frame walls shall have a maximum height of two stories unless constructed in accordance with an approved design. Wall framing shall be continuous from lowest floor to the wall top plate at the roof. Braced wall panels shall extend to the full-height of the balloon frame wall. All edges of sheathing shall be supported on and fastened to blocking or framing. The required brace wall panel length assigned to the balloon frame wall shall be based on the bracing required for the lowest floor level supporting the balloon frame wall as determined in accordance with Section R602.10.2 or R602.10.3. For balloon framed walls having a maximum height of two stories and a maximum length of 12 feet (3.66 m), braced wall panels shall be permitted to be placed parallel to the balloon framed wall on each side and at each story adjacent to the balloon framed wall, and no bracing shall be required for the balloon frame wall portion. Two story interior open ceiling areas shall not extend into the building from the balloon frame wall more than one-half the distance to the opposite building side unless bracing around the opening in the floor diaphragm is designed in accordance with Section R602.10.4.

~~**R602.12 Simplified wall bracing.** Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.~~

1. ~~There shall be no more than two stories above the top of a concrete or masonry foundation or basement wall.Permanent wood foundations shall not be permitted.~~
2. ~~Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.~~
3. ~~Wall height shall not be greater than 10 feet (2743 mm).~~
4. ~~The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.~~
5. ~~All exterior walls shall have gypsum board with a minimum thickness of $^1/_2$ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.~~
6. ~~The structure shall be located where the basic wind speed is less than or equal to 90 mph (40 m/s), and the Exposure Category is A or B.~~
7. ~~The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.~~
8. ~~Cripple walls shall not be permitted in two-story buildings.~~

~~**R602.12.1 Circumscribed rectangle.** The bracing required for each building shall be determined by circumscribing a rectangle around the entire building on each floor as shown in Figure R602.12.1. The rectangle shall surround all enclosed offsets and projections such as sunrooms and attached garages. Open structures, such as carports and decks, shall be permitted to be excluded. The rectangle shall have no side greater than 60 feet (18 288 mm), and the ratio between the long side and short side shall be a maximum of 3:1.~~

~~**R602.12.2 Sheathing materials.** The following sheathing materials installed on the exterior side of exterior walls shall be used to construct a bracing unit as defined in Section R602.12.3. Mixing materials is prohibited.~~

1. ~~Wood structural panels with a minimum thickness of $^3/_8$ inch (9.5 mm) fastened in accordance with Table R602.3(3).~~

2. ~~Structural fiberboard sheathing with a minimum thickness of $^1/_2$ inch (12.7 mm) fastened in accordance with Table R602.3(1).~~

~~**R602.12.3 Bracing unit.** A bracing unit shall be a full-height sheathed segment of the exterior wall with no openings or vertical or horizontal offsets and a minimum length as specified herein. Interior walls shall not contribute toward the amount of required bracing. Mixing of Items 1 and 2 is prohibited on the same story.~~

1. ~~Where all framed portions of all exterior walls are sheathed in accordance with Section R602.12.2, including wall areas between bracing units, above and below openings and on gable end walls, the minimum length of a bracing unit shall be 3 feet (914 mm).~~
2. ~~Where the exterior walls are braced with sheathing panels in accordance with Section R602.12.2 and areas between bracing units are covered with other materials, the minimum length of a bracing unit shall be 4 feet (1219 mm).~~

~~**R602.12.3.1 Multiple bracing units.** Segments of wall compliant with Section R602.12.3 and longer than the minimum bracing unit length shall be considered as multiple bracing units. The number of bracing units shall be determined by dividing the wall segment length by the minimum bracing unit length. Full-height sheathed segments of wall narrower than the minimum bracing unit length shall not contribute toward a bracing unit except as specified in Section R602.12.6.~~

~~**R602.12.4 Number of bracing units.** Each side of the circumscribed rectangle, as shown in Figure R602.12.1, shall have, at a minimum, the number of bracing units in accordance with Table R602.12.4 placed on the parallel exterior walls facing the side of the rectangle. Bracing units shall then be placed using the distribution requirements specified in Section R602.12.5.~~

~~**R602.12.5 Distribution of bracing units.** The placement of bracing units on exterior walls shall meet all of the following requirements as shown in Figure R602.12.5.~~

1. ~~A bracing unit shall begin no more than 12 feet (3658 mm) from any wall corner.~~
2. ~~The distance between adjacent edges of bracing units shall be no greater than 20 feet (6096 mm).~~
3. ~~Segments of wall greater than 8 feet (2438 mm) in length shall have a minimum of one bracing unit.~~

~~**R602.12.6 Narrow panels.** The bracing methods referenced in Section R602.10 and specified in Sections R602.12.6.1 through R602.12.6.3 shall be permitted when using simplified wall bracing.~~

~~**R602.12.6.1 Method CS-G.** *Braced wall panels* constructed as Method CS-G in accordance with Tables R602.10.4 and R602.10.5 shall be permitted for one-story garages when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-G panel shall be equivalent to 0.5 of a bracing unit. Segments of wall which include a Method CS-G panel shall meet the requirements of Section R602.10.4.2.~~

~~**R602.12.6.2 Method CS-PF.** *Braced wall panels* constructed as Method CS-PF in accordance with Section R602.10.6.4 shall be permitted when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-PF panel shall equal 0.5 bracing units. A maximum of four CS-PF panels shall be permitted on all segments of walls parallel to each side of the circumscribed rectangle. Segments of wall which include a Method CS-PF panel shall meet the requirements of Section R602.10.4.2.~~

~~**R602.12.6.3 Methods PFH and PFG.** *Braced wall panels* constructed as Method PFH and PFG shall be permitted when bracing units are constructed using wood structural panels. Each PFH panel shall equal one bracing unit and each PFG panel shall be equal to 0.75 bracing units.~~

~~**R602.12.7 Lateral support.** For bracing units located along the eaves, the vertical distance from the outside edge of the top wall plate to the roof sheathing above shall not exceed 9.25 inches (235 mm) at the location of a bracing unit unless lateral support is provided in accordance with Section R602.10.8.2.~~

~~**R602.12.8 Stem walls.** Masonry stem walls with a height and length of 48 inches (1219 mm) or less supporting a bracing unit or a Method CS-G, CS-PF or PFG *braced wall panel* shall be constructed in accordance with Figure R602.10.9. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall be reinforced sized and located in accordance with Figure R602.10.9.~~

Reason: In recent years, great concern has arisen regarding the complexity of the IRC wall bracing provisions. Much good work was done by the ICC Ad Hoc Wall Bracing Committee to resolve significant technical issues and deficiencies in the IRC bracing provisions, including conventional bracing provisions which had not kept up with changes in housing over the years, resulting in concerns with structural safety and performance. Unfortunately, the technical solutions required added complexity to resolve. Now, in an understandable reaction to this added complexity, many attempts are being made to simplify the wall bracing provisions. However, some of these attempts at simplicity are doing so by essentially picking “winners and losers” (e.g., removing certain bracing methods and materials from consideration in a favored simplified approach). The approach of this proposal is to be inclusive and simple while adhering to the technical advancements achieved by the ICC Ad Hoc Wall Bracing Committee.

The proposal is formatted as follows for ease of use:

1. Section R602.10 -- provides charging language for two simplified bracing approaches (intermittent and continuous), an engineered approach, and the existing IRC 2012 provisions (Appendix R).
2. Section R602.10.1 – provides bracing methods and materials common to both simplified methods and is non-exclusive. [1 sentence, 2 Tables, and 1 Figure]
3. Section R602.10.2 – simplified intermittent bracing (for low wind only, 90 and 100 mph) [1 page of text, 1 Table, 1 Figure]
4. Section R602.10.3 – simplified continuous bracing (for up to 110 mph, wind); [1 page of text, 1 Table and 3 Figures]
5. Section R602.10.4 – provides two engineering approaches, one of which is consistent with IRC bracing provisions to permit engineered solutions analyzed in a manner equivalent to the IRC; [1 paragraph of text]
6. Section R602.10.5 – provides various load path details important to overall building performance and connectivity for any bracing method.[2-1/2 pages including text, figures, and table]

To achieve the goal of this proposal, several factors have been considered as described next.

First, Canada recently updated its residential wall bracing provisions considering the same issues and data that the ICC Ad Hoc Committee considered. However, they ended up with a different solution worthy of consideration and, thus, influenced the approach taken in this proposal. Their approach essentially continued traditional (conventional) bracing practices in the lowest hazard regions of the country in recognition that bracing problems were rare (even in newer homes) in this condition. Thus, for much of the country the simple “status quo” was considered adequate absent any strong evidence to the contrary. This same approach is relevant to the US. In moderate hazard regions of the country, an approach similar to that developed by the IRC Ad Hoc Wall Bracing Committee was implemented in Canada. Finally, in the most extreme high hazard regions of Canada engineered design was implemented (which is already the case for many of the high hazard areas in the US).

Second, a simple and limited scope conventional bracing practice is still effective in the IBC, Section 2308. If these provisions are still considered adequate for commercial building applications, then are they not also suitable for housing? The continuing existence and use of the IBC 2308 conventional wall bracing provisions, as well as past experience, suggest strongly that the answer is YES. The IBC 2308 conventional bracing provisions are inclusive and simple to use. Further, they have been recently reformatted for clarity in IBC 2015 proposal S273-11/12 which was approved at the Group A FAH last fall. Therefore, this proposal makes use of this concept, upgrades the approach to improve bracing performance for wind, and applies it in a limited set of conditions for housing in the IRC applicable only to the lowest hazard regions where past experience has been successful. Again, this action also is consistent with the approach taken in Canada after deliberations of a special task group.

Third, for a broader range of hazard conditions covered by the IRC, a simplified approach based primarily on continuous sheathing methods is adopted. This approach is similar to that being considered in various states (including VA from which this approach was derived). As hazards become greater and bracing loads on homes increase, continuous sheathed bracing becomes a more viable and practical bracing method for homes. This is driven by practicality and performance, not simply as a matter of picking “winners and losers” in the interest of simplifying the code by reducing bracing options and restricting market competition without clear cause in even the lowest hazard regions.

Fourth, in areas where hazards and bracing loads are extreme, engineered solutions provide a better means of maintaining simplicity, affordability or efficiency, and performance. An engineered design has a greater ability and flexibility in addressing load path details which are difficult and complex to adequately address in a prescriptive building code (without making the code more complex than many users are willing to tolerate). In this case, engineering provides a value-added solution. However, to fully realize the value potential of engineering, engineers must be equipped with the same efficient design methodology used by the IRC Ad Hoc Wall Bracing Committee to upgrade the IRC wall bracing provisions. Otherwise, engineering will be non-competitive and resisted by the housing market for no other reason than not having access to the design methods as used to develop the IRC wall bracing provisions. Therefore, this proposal recognizes conventional engineering practices (e.g., IBC and IRC Section 301) and also includes the option to use design consistent with the IRC for buildings within the scope of the IRC. The IRC commentary should be coordinated with the proposal by referencing the following peer-reviewed journal paper explaining the engineering basis of the IRC bracing provisions:

Crandell, J. and Martin, Z., "The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)", *Wood Design Focus*, Forest Products Society, Madison, WI, Spring 2009.

Fifth, for special conditions not addressed in the proposed simplified conventional bracing and continuous sheathing methods addressed in this proposal, the existing IRC provisions are listed as one of the accepted means of a bracing design and are placed in Appendix R. The more complex provisions of the IRC should only be required in special cases, realizing that these provisions add significant complexity not necessary for most homes in most states and regions of the US.

Finally, bracing materials and methods in the IRC were evaluated using very specific performance criteria that are not currently made explicit such that innovation is encouraged and competition between incumbent materials and new materials is conducted on a fair and level playing field. Therefore, this proposal includes language to allow equivalency on the basis of equivalent bracing performance, not just a narrow equivalency concept based only on equivalency of materials (e.g., a weaker bracing material should be considered as equivalent when a greater amount is required to provide equivalent bracing performance of a building in end use). While this seems like common sense, it has been a major barrier to innovation, evaluation, acceptance, and fair market competition of alternative means and methods of bracing. This also affects the ability to provide competitive and consistent engineered solutions.

Based on the above points and a clear need to take the IRC wall bracing provisions to the next step to better promote simplicity, affordability, performance, and innovation, your support for approval of this proposal is requested.

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

R602.10 (NEW)-RB-CRANDELL-LAUTRUP-WAINRIGHT.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The separation of seismic and non-seismic bracing could just as easily be done within the code. Jurisdiction doesn't always adopt the appendix. Placing the seismic bracing into the appendix would leave a significant portion of the country without a prescriptive high-seismic bracing design.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

APPENDIX R
SIMPLIFIED WALL BRACING PROVISIONS FOR LOW-HAZARD REGIONS

(This appendix is informative and is not part of the *code*.)

AR101 Scope. These bracing provisions shall apply to one- and two-family dwellings located in regions where the ultimate design wind speed does not exceed 140 mph (225 km/h) and where the Seismic Design Category is A or B, or Seismic Design Category C for single-family detached homes, as determined in accordance with Table R301.2(1) of the *International Residential Code*.

AR102 Wall bracing. Buildings, and portions thereof, shall be braced in accordance with one or more of the following sections using bracing materials and methods complying with Section AR102.1 and load path detailing in accordance with Section AR102.5:

1. Intermittent bracing per Section AR102.2,
2. Continuous sheathing per Section AR102.3, or
3. Engineered design per Section AR102.4.

Where a building, or portion thereof, does not comply with Section AR102.2 or Section AR102.3, those portions shall be designed and constructed in accordance with Section AR102.4.

AR102.1 Bracing materials and methods. Wall bracing materials and methods shall comply with Table AR102.1(1).

TABLE AR102.1(1)
BRACING METHODS[a,b]

Method	Minimum Brace Material Thickness or Size	Minimum Braced Wall Panel Width or Brace Angle	Connection Criteria	
			Minimum Fasteners	**Maximum Spacing**
LIB[c] Let-in Bracing	1x4 wood brace (or approved metal brace installed per manufacturer instructions)	45° angle and maximum 16”oc stud spacing[c]	2-8d common nails or 3-8d box nails (2-1/2” long x 0.113” dia.)	Per stud and top and bottom plates
DWB Diagonal wood boards	¾” (1” nominal)	48”	2-8d box nails (2-1/2” long x 0.113” diameter) or 2 – 1-3/4” long 16ga. staples	Per stud and top and bottom plates
WSP Wood structural panel	3/8”	48”[d]	6d common nail or 8d box nail (2-1/2” long x 0.113” diameter)	6” edges, 12” field
SFB Structural Fiberboard Sheathing	½”	48”[d]	1-1/2” long x 0.120” dia. galvanized roofing nails	3” edges, 6” field
GB Gypsum Board (installed on both sides of wall)	½”	96” (48” for use with Section AR102.3)	5d cooler nails or #6 screws	7” edges, 7” field (including top and bottom plates)
PCP Portland cement plaster	¾” (maximum 16”oc stud spacing)	48”	1-1/2” long, 11 gage, 7/16” diameter head nails or 7/8” long, 16 gage staples	6” o.c. on all framing members
CS-WSP[e] Continuously sheathed WSP	3/8”	Refer to Table AR102.1(2)	Same as WSP	Same as WSP
CS-SFB[e] Continuously sheathed SFB	½”		Same as SFB	Same as SFB
PF Portal Frame[f]	7/16”	See Figure AR102.1	See Figure AR102.1	See Figure AR102.1

For SI: 1 inch = 25.4 mm

a. Alternative bracing materials and methods, when approved in accordance with Section R104.11, shall be permitted to be used as a substitute for any of the bracing materials listed in Table A102.1 provided at least equivalent performance is demonstrated. Where the tested bracing strength or stiffness differs from tabulated materials, the bracing amount required for the alternative material shall be permitted to be factored to achieve equivalence.

b. All edges of panel-type wall bracing shall be attached to framing or blocking, except GB bracing horizontal joints shall not be required to be blocked where joints are finished.

c. Method LIB shall not be permitted for walls supporting a roof and two stories. Two LIB braces installed at a 60° angle shall be permitted to be substituted for each 45° angle LIB brace.

d. A braced wall panel shall be permitted to be reduced to a 32-inch (810 mm) length when studs at each end of the braced wall panel are anchored to foundation or framing below using hold-down device with minimum 2,800 lbs (12.5 kN) design tension capacity. For detached single story garages and attached garages supporting roof only, a minimum 24-inch (610 mm) brace panel length shall be permitted on one wall containing one or more garage door openings.

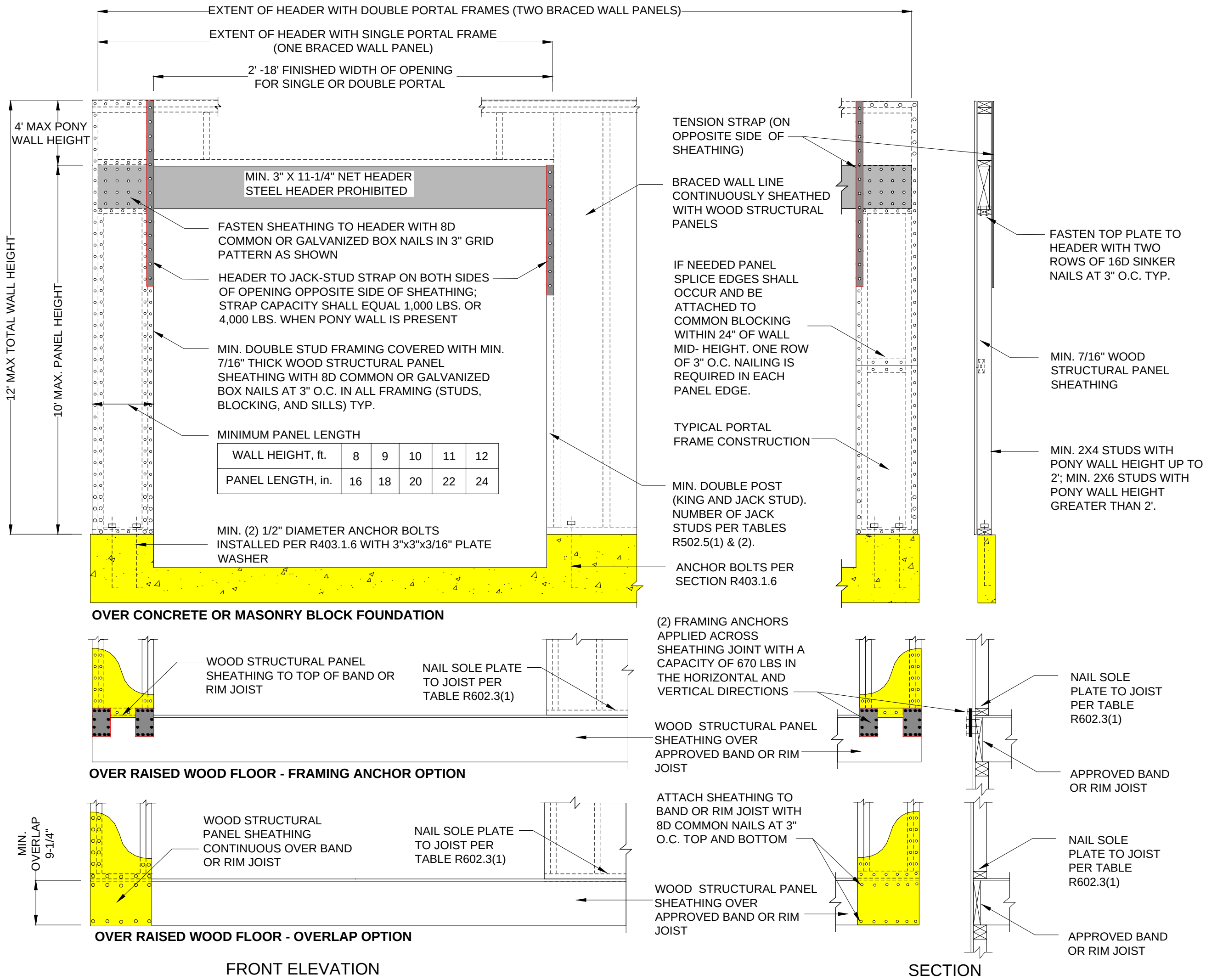
e. Bracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.

TABLE AR102.1(2)
MINIMUM WIDTHS OF METHOD CS-WSP AND CS-SFB BRACED WALL PANELS

Maximum Opening Height Adjacent to Braced Wall Panel	Minimum Length of Braced Wall Panel (inches)			
	8’ tall wall	**9’ tall wall**	**10’ tall wall**	**12’ tall wall**
Up to 5’ – 4”	24	27	30	36
Up to 6’ – 8”	32	30	30	36
Up to 8’	48	41	38	36
Up to 9’	-	54	46	41

Up to 10’	-	-	60	48
Up to 12’	-	-	-	72

For SI: 1 foot = 305 mm, 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 lb = 4.45 N

NOTE: Minimum PF panel length shall be 24 inches (610 mm) for use with Section AR102.2.

FIGURE AR102.1

METHOD PF – PORTAL FRAME CONSTRUCTION

AR102.2 Intermittent Bracing. Intermittent bracing shall comply with Sections AR102.2.1 and AR102.2.2.

AR102.2.1 Limitations. The intermittent bracing requirements of Section R102.2.2 shall be limited to the following conditions of use:

1. Basic design wind speed shall not exceed 130 mph (209 km/h).
2. Bracing methods shall be limited to LIB, DWB, WSP, SFB, GB, PCP, and PF in accordance with Table AR102.1(1).
3. Overall plan length of the house shall not exceed 75 feet (22.9 m) and the overall plan width shall be no less than one-third the overall plan length.
4. Wall height at each story level shall not exceed 10 feet (3.05 m).
5. Roof eave-to-ridge height shall not exceed 10 feet (3.05 m) unless the roof is considered as an additional story for the purpose of determining bracing amounts required.
6. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5 of the *International Residential Code*.
7. Floors supporting brace panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
8. Townhouses shall be stabilized independently of adjacent units unless a design is provided to permit lateral load transfer between adjacent units.

AR102.2.2 Requirements. Braced wall panels shall be constructed of bracing methods, materials, and minimum braced panel lengths complying with Table AR102.1(1). The number of braced wall panels required for each side of a building (elevation view) at each story level of the building shall comply with Table AR102.2.2 and shall be oriented parallel to the building side. The following additional requirements shall apply:

1. In no case shall the amount of bracing be less than two braced wall panels on exterior walls comprising each side of a building (elevation view) for each story level of the building.
2. Braced wall panels shall be located on each building side at each story level in accordance with Figure AR102.2.2.
3. No more than one-half the number of braced wall panels required on a building side shall be permitted to be relocated from exterior walls to interior walls oriented in the same plan direction and within one-half the floor plan dimension perpendicular to the exterior wall.
4. Use of multiple bracing methods and materials complying with Table AR102.1(1) shall be permitted.
5. Houses with skewed wings shall be constructed in accordance with either Section AR102.3 or designed in accordance with Section AR102.4.
6. Garage door openings supporting a floor load above shall be braced using Method PF unless the building plan level containing the garage opening wall complies with all the bracing requirements of this section.
7. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

TABLE AR102.2.2
NUMBER OF BRACED WALL PANELS REQUIRED
FOR EACH HOUSE ELEVATION (BUILDING SIDE) AT EACH STORY LEVEL[1]

Wind Velocity	Story Level Supporting:	Longest Overall Dimension of Floor Plan for a Given Story Level		
		25'	50'	75'
115 mph	Roof Only	1	2	3
	Roof + 1 Story	2	4	6
	Roof + 2 Stories	3	6	9
130 mph	Roof Only	2	3	4
	Roof + 1 Story	3	5	8
	Roof + 2 Stories	4	8	11

For SI: 1foot = 305 mm; 1 mph = 1.61 km/h
a. Interpolation between dimensions shall be permitted. Extrapolation is prohibited.
b. Table applies to wind exposure B. For wind exposure C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively.
c. Fractions of panels shall be rounded to the nearest one-half braced wall panel. The following braced wall panel conditions shall be permitted to be counted as one-half a braced wall panel: (1) one 60 degree LIB, (2) one 48" GB or one 96" GB with gypsum wall board on one side, or (3) one 36" WSP, SFB, PCP braced wall panel for wall heights not more than 9 feet (2.75 m), or (4) one Method PF brace panel having a minimum width of 24 inches (610 mm).

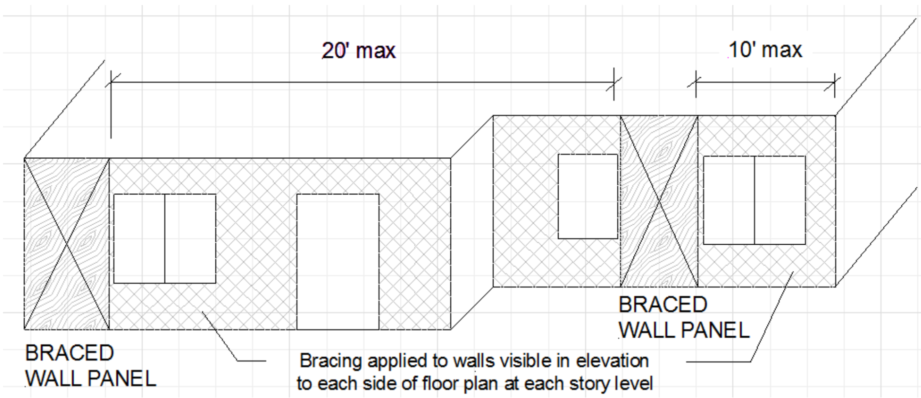


FIGURE AR102.2.2
LOCATION OF BRACED WALL PANELS

AR102.3 Continuous Sheathing.

AR102.3.1 Limitations. The continuous sheathing requirements of Section AR102.3 shall be limited to bracing methods CS-WSP and CS-SFB in accordance with Table AR102.1(1) with the following conditions of use:

1. Basic design wind speed shall not exceed 140 mph (225 km/h).
2. Wall height at each story level shall not exceed 12 feet (3.66 m).
3. Eave to ridge height shall not exceed 20 feet (6.10 m).
4. Exterior walls shall be sheathed on all sheathable surfaces including infill areas between braced wall panels, above and below wall openings and on gable end walls.
5. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5 of the *International Residential Code*.
6. Floors supporting braced wall panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
7. Townhouses shall be stabilized independently of adjacent units, unless a design is provided to permit lateral load transfer between adjacent units.

AR102.3.2 Requirements. The required length of bracing for each side of a building (plan elevation) at each story level shall be determined using Table AR102.3.2 and Figure AR102.3(1). The cumulative contributing length of braced wall panels assigned to a rectangle side, each complying with Table AR102.1(1), shall be greater than or equal to the required length of bracing. The following additional requirements shall apply:

1. Braced wall panels on exterior or interior walls shall be assigned to the nearest rectangle side as shown in Figure AR102.3(2) for each story level floor plan.
2. Braced wall panels shall be distributed and installed in accordance with Figure AR102.3(3).
3. A minimum of one-half the required bracing amount for each rectangle side shall be located on exterior walls within 8 feet of the location of the rectangle side.
4. Interior braced wall panels using Method GB shall be assigned to the closest parallel rectangle side and shall contribute 0.5 times their actual length.
5. The bracing amount provided on an upper story building side shall be “deemed-to-comply” where it equals or exceeds the amount of bracing required for the story immediately below.

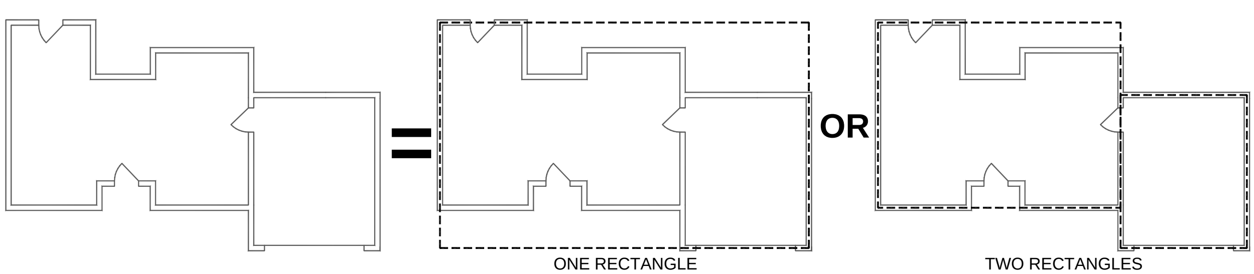


FIGURE AR102.3(1)
CIRCUMSCRIBED RECTANGLES[a,b,c]

a. Each floor plan level shall be circumscribed with one or more rectangles around the entire floor plan at the floor level under consideration as shown in Figure AR102.3(1).

b. Rectangles shall surround all enclosed offsets and projections such as sunrooms and attached garages for a given story level floor plan. Chimneys, partial height projections, and open structures, such as carports and decks, shall be excluded from the rectangle.

c. Each rectangle shall have no side greater than 80 feet (24.4 m) with a maximum rectangle length-to-width ratio of 3:1. Rectangles shall be permitted to be skewed to accommodate diagonal walls.

TABLE AR102.3.2
REQUIRED LENGTH OF BRACING ALONG EACH SIDE OF A CIRCUMSCRIBED RECTANGLE [a,b,c,d]

WIND SPEED	EAVE-TO RIDGE HEIGHT (FEET)	NUMBER OF LEVELS ABOVE [e]	REQUIRED LENGTH (FEET) OF BRACING ON ANYSIDE OF RECTANGLE — Length of perpendicular side (ft)[f]							
			10	20	30	40	50	60	70	80
115	10	None	2.0	3.5	5.0	6.0	7.5	9.0	10.5	12.0
		One story	3.5	6.5	9.0	12.0	14.5	17.0	19.8	22.6
		Two stories	5.0	9.5	13.5	17.5	21.5	25.5	29.2	33.4
	15	None	2.6	4.6	6.5	7.8	9.8	11.7	13.7	15.7
		One story	4.0	7.5	10.4	13.8	16.7	19.6	22.9	26.2
		Two stories	5.5	10.5	14.9	19.3	23.7	27.5	32.1	36.7
	20	None	2.9	5.2	7.3	8.8	11.1	13.2	15.4	17.6
		One story	4.5	8.5	11.8	15.6	18.9	22.1	25.8	29.5
		Two stories	6.2	11.9	16.8	21.8	27.3	31.1	36.3	41.5
130	10	None	2.5	4.0	6.0	7.5	9.5	11.0	12.8	14.6
		One story	4.5	8.0	11.0	14.5	18.0	21.0	24.5	28.0
		Two stories	6.0	11.5	16.5	21.5	26.5	31.0	36.2	41.4
	15	None	3.4	5.2	7.8	9.8	12.4	14.3	16.7	19.1
		One story	5.2	9.2	12.7	16.7	20.7	24.2	28.2	32.2
		Two stories	6.6	12.7	18.2	23.7	29.2	34.1	39.8	45.5
	20	None	3.8	5.9	8.8	11.1	14.0	16.2	18.9	21.6
		One story	5.9	10.4	14.4	18.9	23.4	27.3	31.8	36.3
		Two stories	7.5	14.4	20.6	26.8	33.0	38.5	44.9	51.3
140	10	None	3.0	5.0	7.0	9.0	11.5	13.3	15.5	17.5
		One story	5.0	9.5	13.5	17.5	21.5	25.5	29.5	34.0
		Two stories	7.5	14.0	20.0	26.0	32.0	37.5	44.0	50.0
	15	None	4.2	6.3	9.5	11.9	15.0	17.3	20.2	23.1
		One story	6.3	11.2	15.4	20.2	25.0	29.3	34.2	39.1
		Two stories	8.0	15.4	22.0	28.7	35.3	41.3	48.2	55.1
	20	None	4.6	7.2	10.6	13.4	16.9	19.6	22.9	26.2
		One story	7.2	12.6	17.4	22.9	28.3	33.0	38.5	44.0
		Two stories	9.1	17.4	24.9	32.4	39.9	46.6	54.4	62.2

For SI: 1 ft = 305 mm; 1 mph = 1.61 km/h

a. Interpolation shall be permitted; extrapolation shall be prohibited.

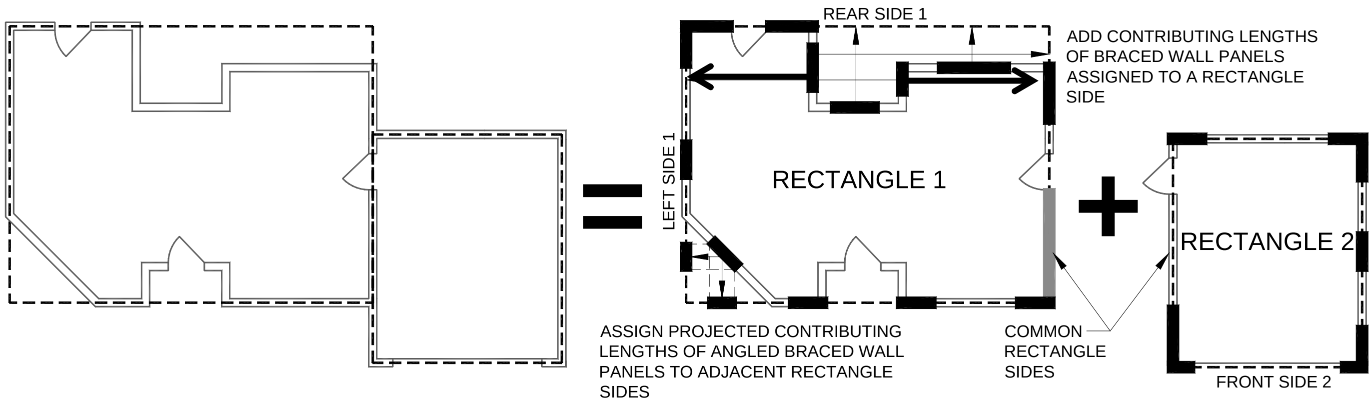
b. For Exposure Category C or D, multiply the required length of bracing by a factor of 1.3 or 1.6, respectively.

c. For wall heights other than 10 ft (3.05 m), multiply the required length of bracing by the following factors: 0.90 for 8 feet (2.44 m), 0.95 for 9 feet (2.74 m), 1.05 for 11 feet (3.35 m) and 1.10 for 12 feet (3.66 m).

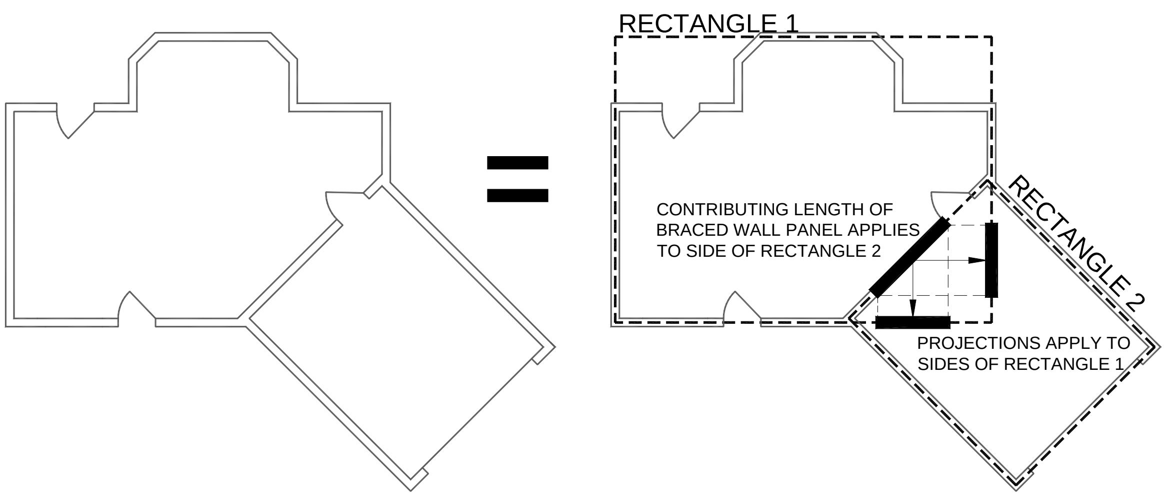
d. Where minimum ½" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.

e. A floor, habitable or otherwise, contained wholly within the roof rafters or roof trusses need not be considered a story for purposes of determining wall bracing provided the eave to ridge height does not exceed 20 feet (6.10 m).

f. Perpendicular sides to the front and rear sides are the left and right sides. Perpendicular sides to the left and right sides are the front and rear sides.



(a) Regular Floor Plan



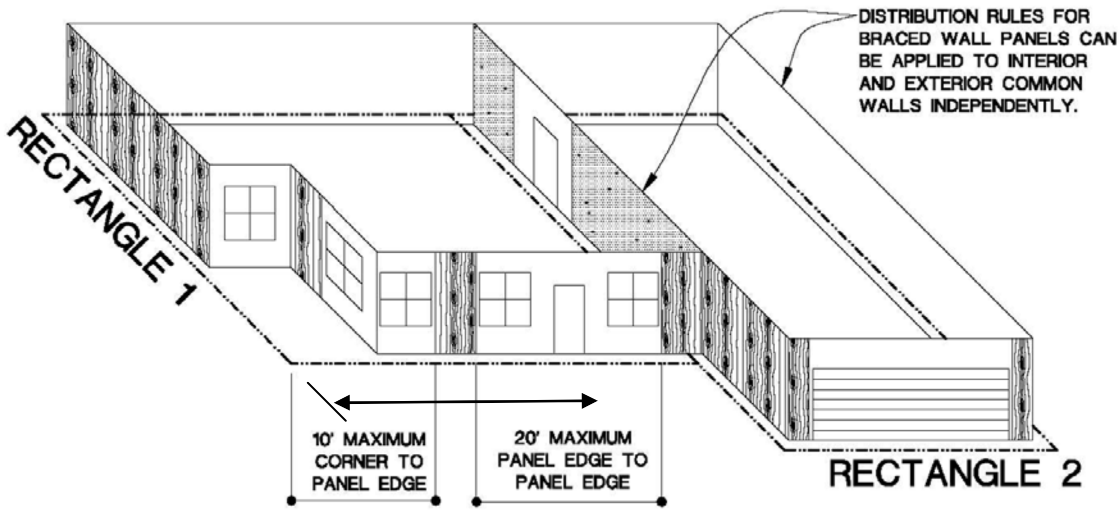
(b) Skewed Floor Plan

FIGURE AR102.3(2)
ASSIGNMENT OF BRACED WALL PANELS
CIRCUMSCRIBED RECTANGLE SIDES[a,b,c]

a. Projected contributing lengths of angled braced wall panels shall be assigned to the closest rectangle sides.

b. Where multiple rectangles share a common side or sides, as shown in Figure AR102.3(2)(a), the total required length of bracing on the common side shall equal the sum of the required lengths from each of the shared rectangle sides.

c. Braced wall panels located on a common wall where skewed rectangles intersect, as shown in Figure AR102.3(2)(b), shall have their contributing length applied towards the required length of bracing for the parallel rectangle side and its projected contributing lengths towards the adjacent skewed rectangle sides. Where the common side of rectangle 2 as shown in Figure AR102.3(2)(b) has no physical wall, the portion shall be designed in accordance with Section AR102.4.



For SI: 1 ft = 304.8 mm

FIGURE AR102.3(3)
DISTRIBUTION OF BRACED WALL PANELS[a,b,c,d]

a. A braced wall panel complying with Table AR102.1(1) shall be located on each elevation view within 10 feet (3.05 m) of the corners of circumscribed rectangles. Only qualified braced wall panel locations are shown; CS-WSP or CS-SFB sheathing shall be applied to all sheathable surfaces of the wall, including areas above and below wall openings.
b. The distance between adjacent edges of braced wall panels shall be no more than 20 feet (6.10 m) as measured along the rectangle side.
c. A minimum 24-inch-wide CS-WSP or 32-inch-wide CS-SFB panel shall be located on each side of inside and outside corners or an 800 lb rated tie-down shall be fastened to the edge of the braced wall panel closest to each corner.
d. Interior and exterior wall segments which contribute to the common sides of multiple rectangles shall be permitted to apply the distribution requirements given above to each wall segment independently.

AR102.4 Wall bracing by engineered design. Designs using bracing materials and methods listed in Table AR102.1(1) or approved alternative materials and methods shall be permitted and shall comply with accepted engineering practice. Accepted engineering practice shall include the following:

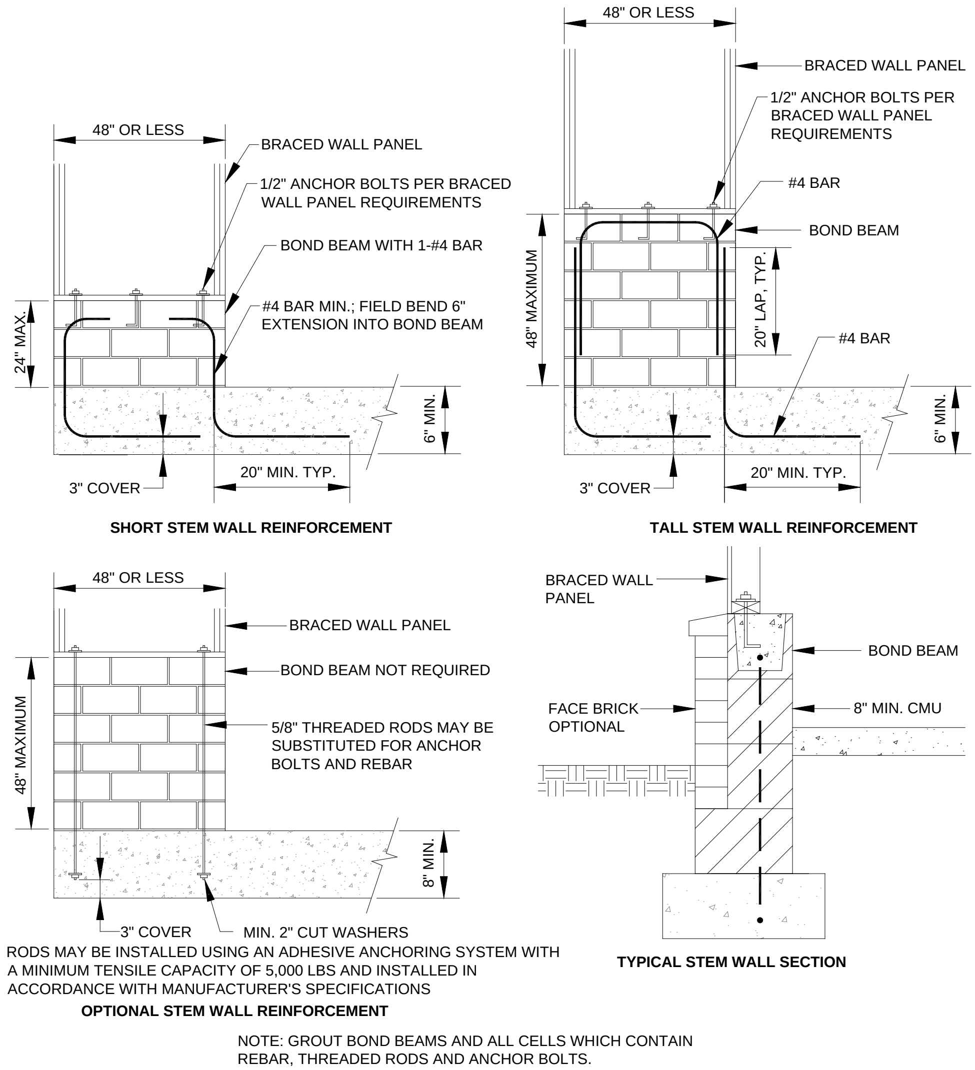
1. Design in accordance with Section R301, or
2. Design equivalent to the analysis basis and scope of the prescriptive provisions of Section R602.10 of the *International Residential Code*, including determination of design loads, design unit shear values, and bracing amounts.
3. Design based on the bracing manufacturer's approved design data and installation instructions.

AR102.5 Load path details. Construction shall comply with applicable detailing requirements of this section to ensure an adequate continuous load path for transfer of bracing loads and uplift loads from the roof to the foundation.

AR102.5.1 Wind uplift load path. Framing connections to transfer roof uplift forces shall comply with Section R602.3.5 and Section R802.11 of the *International Residential Code*.

AR102.5.2 Foundation anchorage. Braced wall panels shall be connected to the foundation per Section R403.1.6 of the *International Residential Code* and as required in Figure AR102.1 for portal frames (Method PF).

AR102.5.3 Masonry or concrete pedestals. Masonry or concrete stem walls with a length of 48 inches (1220 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure AR102.5.3. Concrete stem walls shall be 6" nominal minimum thickness.



For SI: 1 in=25.4 mm

FIGURE AR102.5.3
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

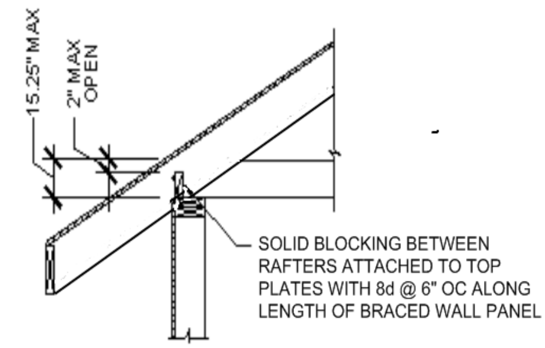
AR102.5.4 Blocking of floor framing. Where parallel to floor framing, braced wall panels shall be connected to a band, rim or header joist, floor framing or perpendicular full-height solid blocking between floor framing at 16 inches (406 mm) on center. Where perpendicular to floor framing, braced wall panels shall be connected to full-height solid blocking between floor framing. Attachments shall be in accordance with Table R602.3(1) of the *International Residential Code*. Manufactured lumber or truss blocking panels shall be permitted to substitute for full-height solid blocking.

AR102.5.5 Blocking of roof framing. Where parallel to roof framing, braced wall panels shall be connected to a band, rim or header joist, or roof truss. Where perpendicular to roof framing, the top plates of exterior braced wall panels shall be connected to the rafters or roof trusses above in accordance with Table AR102.5.5 and fastened in accordance with Table R602.3(1) of the *International Residential Code*.

TABLE AR102.5.5
BRACED WALL PANEL CONNECTIONS TO PERPENDICULAR ROOF FRAMING

DISTANCE FROM TOP OF BRACED WALL PANEL TO TOP OF RAFTER OR ROOF TRUSS, (in)	REQUIREMENT	REFERENCED FIGURE
≤ 9.25	No blocking required	NA
9.25 – 15.25	Solid 2x blocking between rafters or trusses	AR102.5.5(1)
15.25 – 48	Vertical blocking panels	AR102.5.5(2)
> 48	Designed in accordance with accepted engineering practice	NA

For SI: 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm

FIGURE AR102.5.5(1)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR TRUSSES

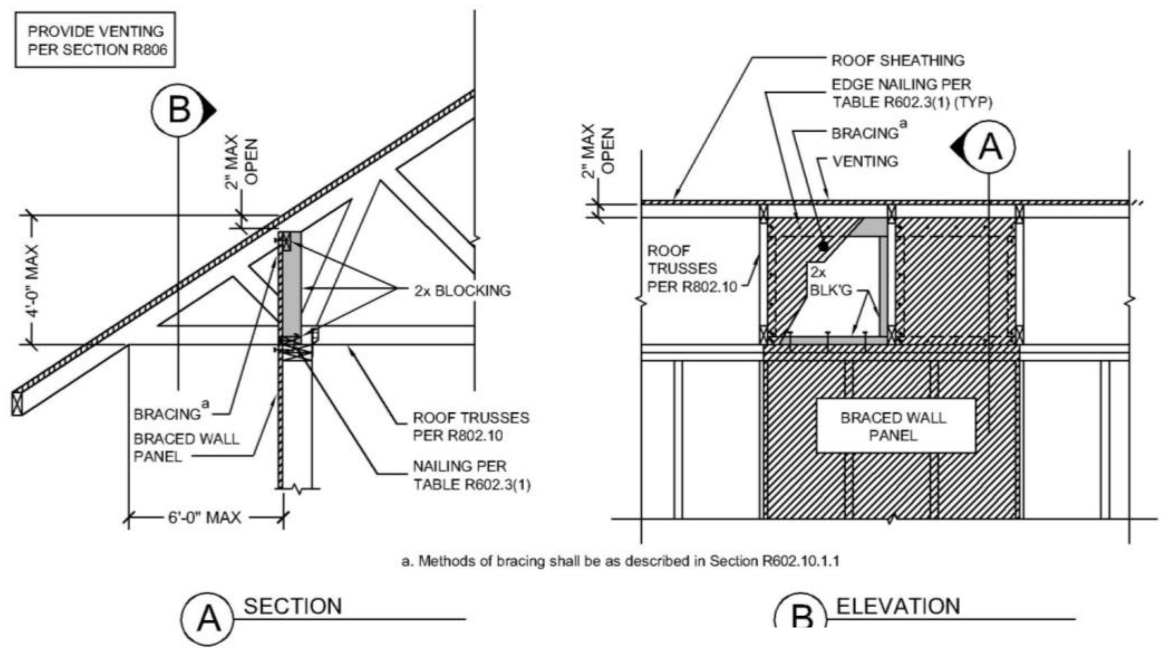


FIGURE AR102.5.5(2)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

AR102.5.6 Cripple walls and framed walls of walk-out basements. The required length of bracing for cripple walls with a maximum height of 48 inches (1220 mm) or less along its entire length shall be equal to the wall above. The required length of bracing for cripple walls with a height greater than 48 inches (1220 mm) at any location along its length and for framed walls of a walk-out basement shall be determined in accordance with Section AR102.2 or AR102.3, considering the cripple wall or walk-out basement as an additional story. As an alternative, the required length of bracing shall be permitted to equal the length required for the wall above multiplied by a factor of 1.15.

AR102.5.7 Open Elevated Foundations. Open elevated foundations, such as pile foundations shall be constructed to transfer all lateral loads from the wall bracing system to the piles or elevated piers, including shears, overturning, and uplift loads. Piles or elevated piers along with their foundations shall be sized and/or embedded to transfer all lateral loads imposed by the wall bracing system to the ground.

AR102.5.8 Balloon frame wall bracing. Balloon frame walls shall have a maximum height of two stories unless constructed in accordance with an approved design. Wall framing shall be continuous from lowest floor to the wall top plate at the roof. Braced wall panels shall extend to the full-height of the balloon frame wall. All edges of sheathing shall be supported on and fastened to blocking or framing. The required brace wall panel length assigned to the balloon frame wall shall be based on the bracing required for the lowest floor level supporting the balloon frame wall as determined in accordance with Section AR102.2 or Section AR102.3. For balloon framed walls having a maximum height of two stories and a maximum length of 12 feet (3.66 m), braced wall panels shall be permitted to be placed parallel to the balloon framed wall on each side and at each story adjacent to the balloon framed wall, and no bracing shall be required for the balloon frame wall portion. Two story interior open ceiling areas shall not extend into the building from the balloon frame wall more than one-half the distance to the opposite building side unless bracing around the opening in the floor diaphragm is designed in accordance with Section AR102.4.

Commenter's Reason: The original proposal is revised based on feedback and direction provided at the first hearing by the code development committee and constructive testimony. The revisions in the public comment are non-technical and only reformat the original proposal and coordinate with other proposals regarding use of ultimate design wind speeds. The existing 2012 IRC bracing provisions remain unchanged and the proposed new simplified bracing provisions are provided as a non-mandatory appendix. States and localities that qualify for use of these provisions can adopt and modify them on an as needed basis to find relief from the complexity of current IRC provisions. Having the appendix will also afford the opportunity for future improvements without constantly changing the provisions in the code that challenge the ability for code users to keep up. The technical justification for the original RB329-13 proposal and this public comment is documented in the proposal agenda for the first hearing.

RB329-13

Final Action: AS AM AMPC____ D

RB337-13
R612.1

Proposed Change as Submitted

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior windows and doors installed in walls. Windows and doors shall be installed ~~and flashed~~ in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: The intent of this proposal is to clarify that flashing requirements for window and door assemblies are provided exclusively in Chapter 7, Section 703.8. The proposal also corrects conflicting language with 703.8 which expressly allows the use of flashing installation alternatives in addition to the window or door manufacturer's installation instructions when applicable.

In addition this proposal provides an editorial correction by making "door", "window", and "wall" in the first sentence plural.

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

R612.1 #1-RB-INKS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The fenestration manufacturer's written instruction for flashing is needed in addition to the Section R703.8 provisions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jeff Inks, Window & Door Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: The committee's action does not address the intent of the proposal which is to correct the conflict that currently exists in the IRC between Section 612.1 and Section 703.8. As stated in the proposal, flashing requirements for window and door assemblies are provided exclusively in Chapter 7, Section 703.8. Maintaining "and flashed" in section 612.1 is counter to the intent of Section 703.8 and needs to corrected as proposed.

Section 703.8 allows necessary options for flashing to be installed in accordance with the flashing manufacturer's installations instructions for applications not covered by the fenestration manufacturer's instructions. It also provides two additional options, which are either in accordance with a method of registered design professional or other approved materials. Those provisions were approved in the last cycle but the term "flashing" was not removed from Section 612.1 creating the conflict.

Regarding the committee's statement (and reason for disapproval) that the fenestration manufacturers flashing installation instructions are needed in addition to the Section 703.8, manufacturers must still provide them in addition to the provisions of Section 703.8 which provide builders with much greater flexibility.

We therefore urge approval as submitted.

Public Comment 2:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: RB337 removes a redundant requirement in Section R612.1 for the flashing of windows and exterior doors. The requirement that windows and doors are to be flashed in accordance with the fenestration manufacturer's installation instructions is redundant to the criteria of Section 703.8, which is also referenced in Section R612.1. The redundancy is confusing and introduces the possibility for conflict within the IRC.

Section R703.8 requires flashing to be installed in accordance with the fenestration manufacturer's installation and flashing instructions. Applications not addressed in the fenestration manufacturer's instructions are to be flashed in accordance with the flashing manufacturer's instructions. If installation instructions are not provided by the fenestration or flashing manufacturer, window and door openings are to be flashed in accordance with the flashing design or method of a registered design professional, or in accordance with other approved methods.

Section R703.8 further specifies that where flashing instructions or details are not provided by the fenestration or flashing manufacturer, pan flashing shall be installed at the sill of exterior window and door openings. Specific details on the manner in which pan flashing is to be installed, if used, are given in Section R703.8.

Finally, Section R703.8 specifies that flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. The charging paragraph of Section R703.8 specifies that all flashing shall be corrosion resistant, and shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. It further specifies that self-adhered membranes used as flashing shall comply with AAMA 711 and that the flashing shall extend to the surface of the exterior wall finish.

The provisions of Section R703.8 have been carefully crafted to provide to the appropriate flashing of exterior wall fenestration. Reference to other requirements in Section R612.2 serve no purpose, and have the potential to create confusion. It is also possible that the code user may never get to Section 703.8 if they only look for the installation instructions provided by the fenestration manufacturer. If that occurs, the window installation may not be done correctly and serious problems with water penetration into the exterior wall cavity can occur.

For this reason it is important that the redundant requirement for flashing of exterior windows and doors in accordance with the fenestration manufacturer's installation instructions be removed. Its removal will then point the code user to Section 703.8 for the flashing of exterior windows and doors, where much more complete provisions abide.

RB337-13

Final Action: AS AM AMPC____ D

RB338-13
R612.1

Proposed Change as Submitted

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's ~~written~~ published installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: This proposals provides an editorial correction by making "door", "window", and "wall" in the first sentence plural and in addition replaces the term "written" with "published" given manufacturers provide installation instructions in both printed and electronic format which can also be printed by the user. The term "published" more clearly reflects how installation instructions are being provided by manufacturers.

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

R612.1 #2-RB-INKS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The installation instructions from the manufacturer needs to be included with the windows and door just like other manufactured components.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeff Inks, Window & Door Manufacturers Association, and Julie Ruth JRuth Code Consulting, representing American Architectural Manufacturers Association request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R612.1 General. This section prescribes performance and construction requirements for windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's published installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. ~~Written~~ Published installation instructions shall be provided by the fenestration manufacturer for each window or door.

Commenter's Reason:

(Inks): The modification in this public comment reflects the revisions proposed in the original proposal and also replaces "Written" with "Published" in the last sentence for consistency (which should have been included in the original proposal).

The primary intent of the original proposal is to replace the term "written" with "published" given manufacturers provide installation instructions in both printed and electronic format which can also be printed by the installer. Manufacturers must still and do provide installation instructions for all of their products. The term "published" more clearly reflects how installation instructions are being provided by manufacturers, and can avoid multiple copies of the same installation instructions for the same windows or doors on the job site which ultimately are not used and become a waste.

The other intent of the original proposal is to make an editorial correction in the first sentence by making “door”, “window”, and “wall” in the first sentence plural and we also maintain that intent.

(Ruth): The intent of RB338 was to permit the use of installation instructions that are published, such as on a website, rather than require written installation instructions to be provided.

The proposal was disapproved by the IRC Code Change committee at the Code Development Hearings. Some committee members expressed concern regarding obtaining installation instructions off of a website.

In reality, however, it is much easier and faster to obtain information off of a fenestration manufacturer’s website than it is to obtain printed copies of their installation instructions direct from the manufacturer if the original copy of the instructions is in any way misplaced or damaged in transit from the manufacturer’s facility to the distributor’s warehouse to the jobsite. For example, a simple Google search for “windows installation instructions” yields installation instructions for a number of major North American fenestration manufacturers. If the name of the fenestration manufacturer is included in the search the results are more specific to that particular manufacturer’s product. Instructions received in this manner can easily be distributed to all concerned interested parties, including the installer and the code official, without the need to first obtain a single printed copy from the manufacturer, then have multiple copies made and then distributing them by hand.

This Public Comment replaces “written” with “published” in the last sentence of Section R612.1. This modification would provide for consistency with the proposed change to the second sentence of the same section.

RB338-13

Final Action: AS AM AMPC____ D

RB-339-13
R612.1, R612.2, R612.3

Proposed Change as Submitted

Proponent: Julie Ruth/JRuth Code Consulting, representing American Architectural Manufacturers Association (julruth@aol.com)

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior window and door assemblies installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

R612.2 Performance. Exterior window~~s~~ and door~~s~~ assemblies shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3).

R612.3 Testing and labeling. Exterior window~~s~~ and sliding door assemblies shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged door assemblies shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.

Reason: This proposal clarifies that the performance of the entire window or door assembly must be evaluated to determine compliance with the IRC. Window and door assemblies include the frame, hardware, weather stripping, thresholds, etc as well as the sash (window) or door slab (door). Only by evaluating the entire assembly can it be determined if the opening provides appropriate resistance to wind load, water penetration and air leakage.

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

R612.1-RB-RUTH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Many window and door assemblies are site assembled. This would require testing of site assembled fenestration which is not practical.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior ~~windows and~~ door assemblies and windows installed in walls. ~~Windows and d~~Doors~~s~~ assemblies and windows shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. ~~Window and d~~Door and window openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each door assembly or window ~~or door~~.

R612.2 Performance. Exterior ~~windows and~~ door~~s~~ assemblies and windows shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3).

R612.3 Testing and labeling. Exterior ~~windows and~~ sliding door assemblies and windows shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged door assemblies shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.

Commenter's Reason: The intent of the original proposal, and this Public Comment, is to clarify that the entire door assembly must be evaluated to determine compliance with code section R612 of the IRC.

During the Dallas CDH there was confusion as to whether the word "assembly" would also apply to windows, and if so, to what extent should other components such as window seats, awnings, etc. be considered part of that assembly?

It was not the intent of the original proposal to require "window assemblies" to be evaluated. The word "window" is understood to mean the assembly of all the components that go into the makeup of a window, including glazing, framing, hardware and sills. Therefore clarification is not needed, and there is a risk that applying it to windows in this section could have the unintended consequences of applying the criteria to components that were not intended.

This Public Comment alters the order in which "windows and doors" appears in the applicable sections. This modification clarifies that the word "assemblies" is only intended to be applied to doors, and not both windows and doors.

The same intent as occurs with "windows" is not as clear with regards to the word "door" in this section. Although the standards referenced by this section clearly intend that the entire door assembly, including door slab, hardware, framing and sill, be evaluated to determine compliance, there is a common misinterpretation of this section that evaluation of the entire assembly is not currently required.

At the present time Section R612.3 of the IRC requires exterior sliding doors to be tested and labeled in accordance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side hinged doors are to be tested and labeled in accordance with this same standard, or comply with Section R612.5. Section R612.5 requires exterior door assemblies that are outside the scope of Section R612.3 to be tested in accordance with ASTM E330.

AAMA/WDMA/CSA 101/I.S.2/A440 requires the testing of the entire door assembly to determine the design pressure rating as well as the air and water penetration resistance of that assembly.

Section R612.5 requires the door assembly to be tested in accordance with ASTM E330 only, to determine its design pressure rating. The test method provided in ASTM E330 is for testing of a fenestration assembly – whether a door, window, curtainwall or storefront system.

During the Dallas CDH RB340 was approved by the IRC Building Committee. If upheld at the FAH, RB340 will add reference to ANSI/AMD 100-13 to Section R612.3. Specifically, R612.3 will then require exterior side-hinged doors to be tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R612.5.

ANSI/AMD 100-13 also requires evaluation of the door assembly for compliance with Section R612.3. ANSI/AMD 100 – 13 requires structural testing of the entire door assembly to ASTM E330 to achieve an initial rating, and retesting of the entire assembly if more than one component is substituted into the assembly.

Section 7.3 of ANSI/AMD 100-13 states that "verification of the construction and performance of the originally rated door system shall be required before any component substitution can take place. Components considered for substitution shall be tested in an assembly that uses the same interactive components, anchorage, and installation as the rated door system as defined in the component evaluation sections of this standard."

The requirements in each of these standards (AAMA/WDMA/CSA 101/I.S.2/A440, ASTM E330 and ANSI/AMD 100-13) points to the need to consider the entire door assembly when evaluating the door's capability of maintaining the integrity of the exterior wall in which it occurs. The entire door system includes not just the slab, but attachment hardware such as hinges, locks and latches, as well as thresholds, sills and framing. Change to any one of these can alter how well the integrity of the opening is maintained during severe wind events. For this reason, component substitution must be reviewed on a component by component basis, with consideration of the entire assembly into which the component is being proposed for substitution.

AAMA believes it is important that the inspecting code official be aware of the need to evaluate the entire door assembly in determining compliance with this section. This Public Comment emphasizes that need, and we urge its approval.

RB339-13

Final Action: AS AM AMPC____ D

RB340-13
R612.3, Chapter 44

Proposed Change as Submitted

Proponent: Jessica Ferris, Association of Millwork Distributors (jferris@amdweb.com)

Revise as follows:

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R612.5.

Add new standard to Chapter 44 as follows:

AMD Association of Millwork Distributors
10047 Robert Trent Jones Parkway
New Port Richey, FL 34655-4649

AMD 100 - Structural Performance Rating of Side-Hinged Exterior Door Systems and Procedures for Component Substitution

Reason: The purpose of this proposed code change is to add a new standard to this section of the code, which provides manufacturers of side-hinged exterior doors the option to certify to a structural standard that includes procedures for component substitution.

Incorporating reference to the AMD 100 standard in Section 612.3 will provide producers of side-hinged exterior door systems (SHEDS) with an acceptable alternative method for testing and labeling structural performance requirements. AMD 100 allows for the interchange or substitution of components while maintaining a structurally rated system, which eases the burden of having to test each door configuration assembled for the marketplace. Like AAMA/WDMA/CSA 101/I.S.2/A440, AMD 100 utilizes the ASTM E330 test method for obtaining design pressure ratings of SHEDS.

SHEDS have requirements that are quite different from exterior windows and sliding doors, and as such, have different considerations. The door industry is comprised of not only manufacturers but also smaller distributor and pre-hanger companies, dealers, and builders that purchase their door components from multiple suppliers and interchange these components in their systems regularly depending on customer needs. AMD 100 upgrades SHEDS without negatively affecting this supply chain.

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

Analysis: A review of the standards proposed for inclusion in the code, AMD 100 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R612.3-RB-FERRIS.doc

Committee Action Hearing Results

For staff analysis of the content of AMD 100 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The issue of component substitution for tested side hinged exterior door has been a controversy for years. Industry now has an ANSI approved standard to address this and it is now needed in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or ANSI/AMD 100, or comply with Section R612.5.

Add new standard to Chapter 44 as follows:

AMD Association of Millwork Distributors
10047 Robert Trent Jones Parkway
New Port Richey, FL 34655-4649

ANSI/AMD 100 - 13 - Structural Performance Rating of Side-Hinged Exterior Door Systems and Procedures for Component Substitution

Commenter's Reason: The proposal, as submitted, does not specify the edition of AMD 100 that is to be considered for reference in the 2015 IRC. There are multiple editions of AMD 100 currently in circulation. Most notable of those are AMD 100 – 12, and ANSI AMD 100 – 13. It is not clear which edition of the standard was reviewed and approved by the IRC – Building Code Change Committee.

There are significant differences between AMD 100 -12 and ANSI/AMD 100 – 13. The methodology used in AMD 100 – 12 to determine the design pressure rating of exterior side hinged doors is significantly flawed. If put into practice it will lead to failures of exterior door systems. Although AAMA still has some concerns with some aspects of ANSI/AMD 100-13, overall the methodology provided in this edition of the standard is a significant improvement over that provided in AMD 100 – 12, and previous versions of that standard. Therefore, if the 2015 IRC is to reference AMD 100 for the design pressure rating of exterior side hinged doors, it is critical that the correct edition of the standard be referenced.

The earlier editions of the standard – AMD 100 – 12 and previous editions, permitted the design pressure rating of an exterior side hinged door assembly to be determined strictly based upon the design pressure rating of the individual components in the assembly. AAMA has determined through testing that this methodology does not work. Specifically, variation from the mean of as much as 37% was witnessed when assemblies constructed of components with the same design pressure rating were tested in accordance with ASTM E330.

ANSI/AMD 100 – 13 requires the entire door assembly to be tested first, and then permits the substitution of individual components into the assembly in a controlled and prescribed manner. This is similar to the approach taken by AAMA in its program to certify doors to AAMA/WDMA/CSA 101/I.S.2/A440.

We believe this is the appropriate approach to be taken in the evaluation of exterior side hinged doors. This Public Comment clarifies that the edition of AMD 100 to which the exterior side hinged door is to be tested and labeled in ANSI/AMD 100 – 13.

RB340-13

Final Action: AS AM AMPC____ D

RB347-13

R613.3.1, R613.3.7 (NEW), Figure R613.5(1), Table R613.5(1), Figure R613.5(2), Table R613.5(2), Figure R613.5(3), Figure R613.5(4), Figure R613.5(5), R613.5.3 (NEW), R613.5.4 (NEW), Figure R613.5.1, Figure R613.5.2, Figure R613.8, R613.8, R613.9, Figure R613.9, R613.10, Table R613.10, R613.10.1

Proposed Change as Submitted

Proponent: Stephen Kerr S.E., Josephson Werdowatz and Associates, Inc., representing self

Revise as follows:

R613.3.1 Core. The core material shall be composed of foam plastic insulation meeting one of the following requirements:

1. Expanded Polystyrene (EPS) in accordance with ASTM C 578 and have a minimum density of 0.90 pounds per cubic feet (14.4 kg/m^3); or
2 Extruded polystyrene (XPS) in accordance with ASTM C 578 and have a minimum density of 1.3 pounds per cubic feet (14.4 kg/m^3); or
~~2~~3. Polyurethane meeting the physical properties shown in Table R613.3.1, or;
~~3~~4. An *approved* alternative.

All cores shall meet the requirements of Section R316.

R613.3.7 Thermal Barrier. SIP walls shall be separated from the interior of a building by an *approved* thermal barrier in accordance with section R316.4.

R613.5.3 Panel to panel connection. SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.5.3 or by other *approved* methods.

R613.5.4 Corner framing. Corner framing of SIP walls shall be constructed in accordance with Figure R613.5.4.

~~**R613.5.3**~~ **R613.5.5 Wall bracing.** SIP walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing for purposes of computing required bracing. SIP walls shall meet the requirements of Section R602.10.4.2 except that SIPs corners shall be fabricated as shown in Figure R613.9. When SIP walls are used for wall bracing, the SIP bottom plate shall be attached to wood framing below in accordance with Table R602.3(1).

~~**R613.8 Connection.** SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.8 or by other *approved* methods.~~

~~**R613.9 Corner framing.** Corner framing of SIP walls shall be constructed in accordance with Figure R613.9.~~

~~**R613.10**~~ **R613.8 Headers.** SIP headers shall be designed and constructed in accordance with Table R613.~~10~~8 and Figure R613.5.1. SIPs headers shall be continuous sections without splines. Headers shall be at least 11 7/8 inches (302 mm) deep. Headers longer than 4 feet (1219 mm) shall be constructed in accordance with Section R602.7.

~~**R613.10.1 Wood structural panel box headers.** Wood structural panel box headers shall be allowed where SIP headers are not applicable. Wood structural panel box headers shall be constructed in accordance with Figure R602.7.2 and Table R602.7.2.~~

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)[a,b,c]

Building Width (ft)[d]

Wind Speed (3-sec gust)		Ground Snow Load (psf)	24			28			32			36			40		
			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
Exp A/B	Exp. C		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5.	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5 4.5~~	4.5	4.5	~~N/A~~ 4.5
110	100	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5 4.5~~
		50	4.5	4.5	4.5	4.5	4.5	~~6.5 4.5~~	4.5	4.5	~~6.5 4.5~~	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5
		70	4.5	4.5	~~6.5 4.5~~	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	6.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	N/A
120	110	20	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5
		30	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~6.5 4.5~~	~~N/A~~ 4.5
		50	4.5	4.5	~~N/A~~ 4.5	4.5	~~6.5 4.5~~	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5
		70	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

a. N/A = ~~Not Applicable.~~ Design required.

b. Deflection criterion: L/240

c. Design load assumptions:

~~Deflection criteria: *L*/240.~~

Roof dead load: ~~7~~10 psf.

Ceiling dead load: 5 psf.

Wind loads based on Table R301.2 (2).

Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)[a,b,c]

Building Width (ft)[d]

Wind Speed (3 – sec gust)		Ground Snow Load (psf)	24			28			32			36			40		
			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
Exp A/B	Exp. C		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~N/A~~ 4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 6.5	~~4.5~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5

100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5
		50	4.5	4.5	~~6.5~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5
		70	4.5	4.5	~~N/A~~ 4.5	4.5	6.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A	N/A
110	100	20	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~6.5~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5
		30	4.5	4.5	~~N/A~~ 4.5	4.5	4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5
		50	4.5	~~6.5~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A
		70	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	N/A	N/A	N/A	N/A	N/A
120	110	20	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A
		30	4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	~~N/A~~ 6.5	N/A
		50	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	N/A	N/A	N/A	N/A	N/A
		70	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 6.5	N/A	~~N/A~~ 6.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

a. N/A = ~~Not Applicable.~~ Design required.

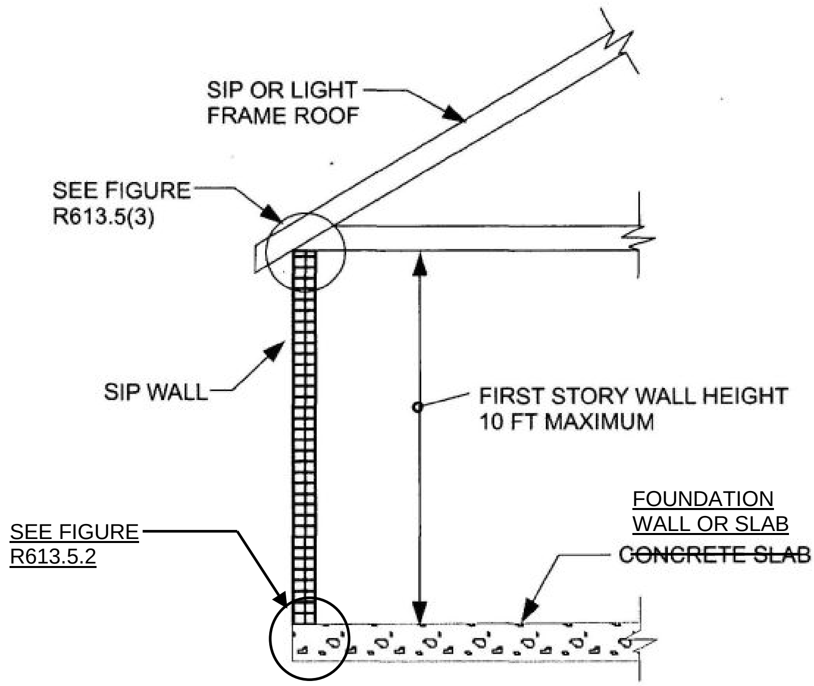
b. Deflection criterion: L/240

c. Design load assumptions:

~~Deflection criteria: L/240.~~
Roof dead load: ~~7~~10 psf.
Ceiling dead load: 5 psf.
Second floor live load: 30 psf.
Second floor dead load: 10 psf.
Second floor dead load from walls: 10 psf.
Wind loads based on Table R301.2 (2).

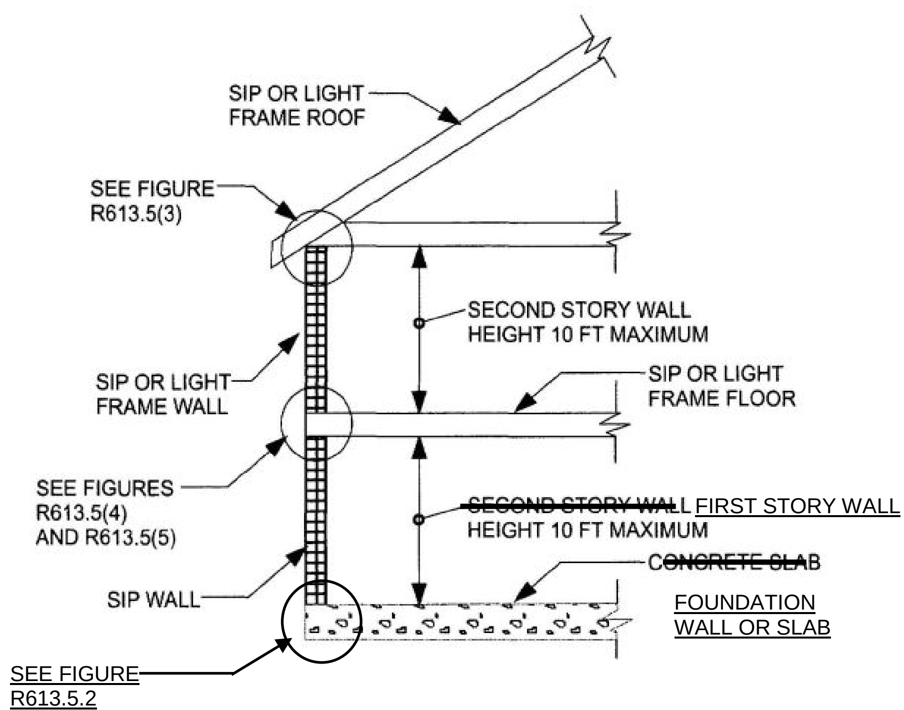
Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.



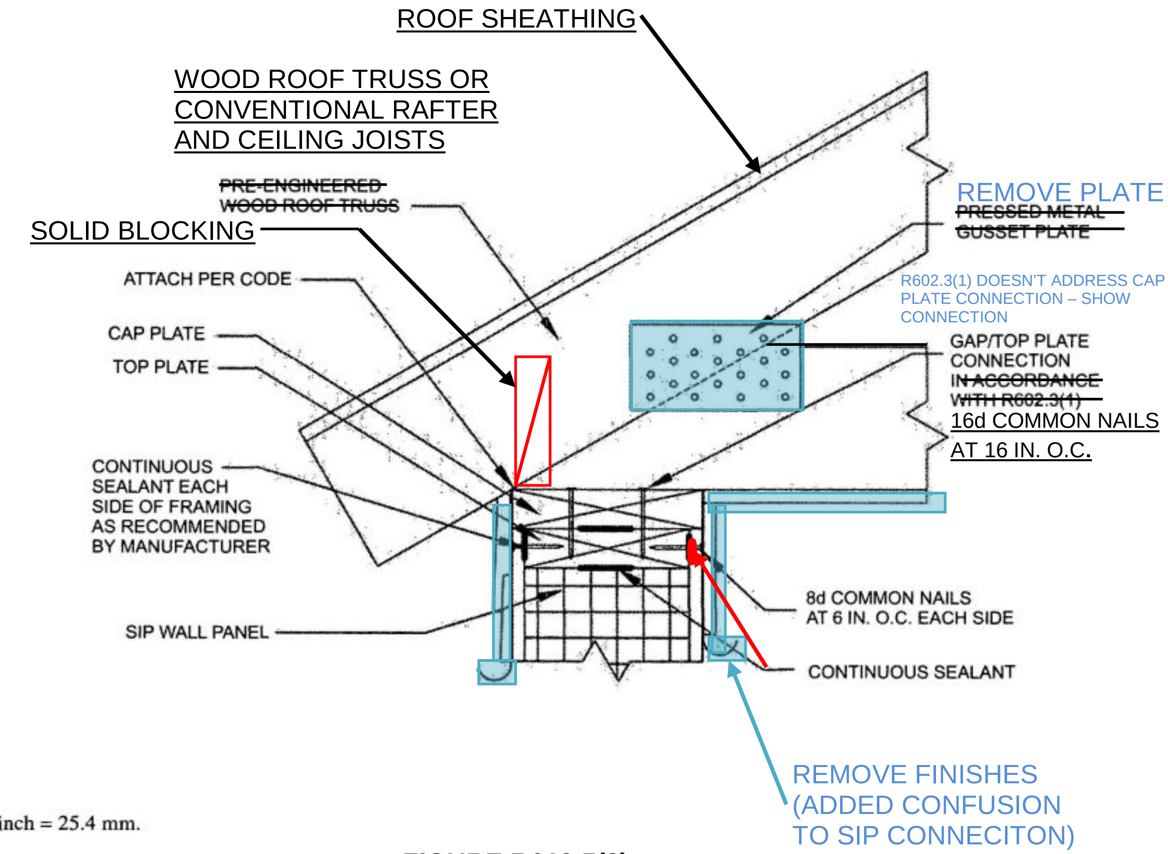
For SI: 1 foot = 304.8 mm.

FIGURE R613.5(1)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS



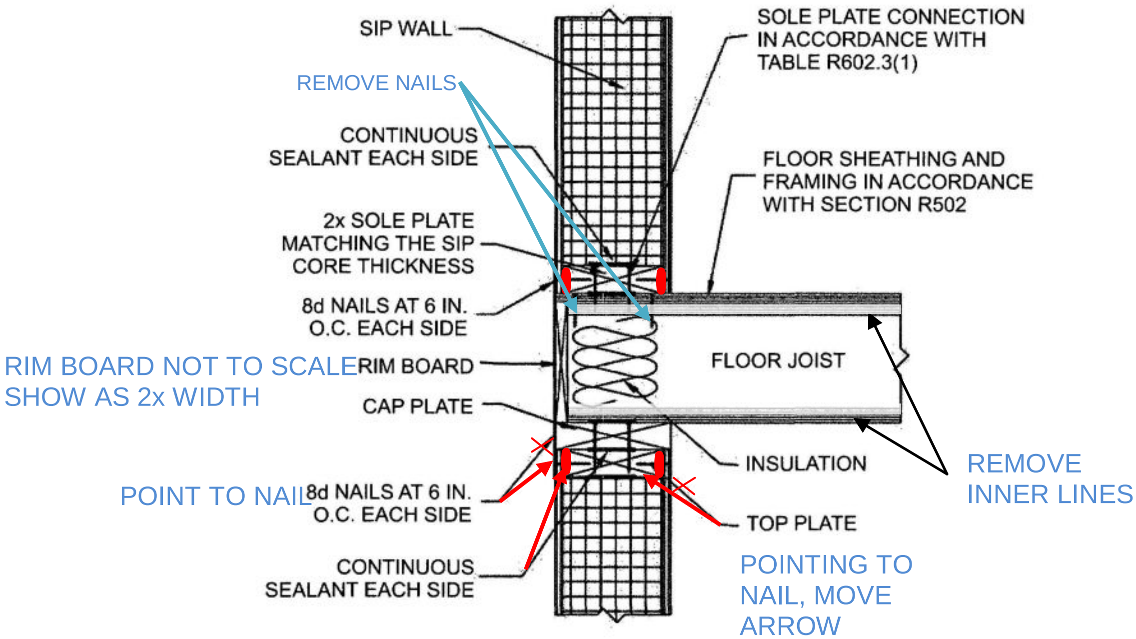
For SI: 1 foot = 304.8 mm.

FIGURE R613.5(2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS



For SI: 1 inch = 25.4 mm.

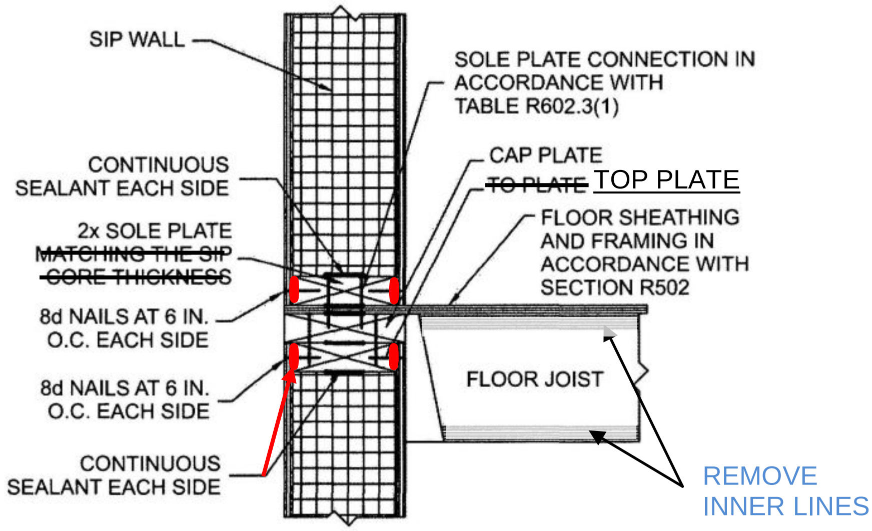
FIGURE R613.5(3)
TRUSSED ROOF TO TOP PLATE CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Table R602.3(1) and (2) as appropriate.

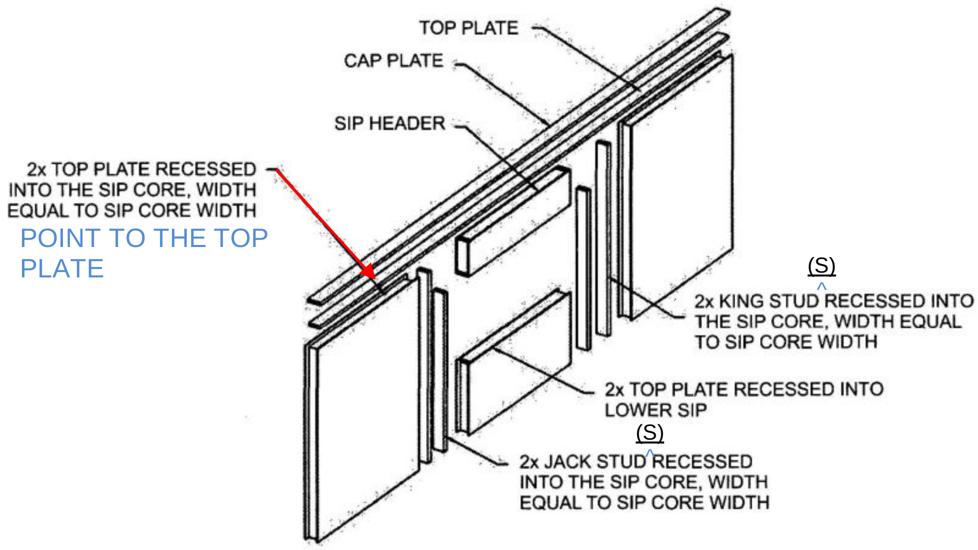
FIGURE R613.5(4)
SIP WALL TO WALL PLATFORM FRAME CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2), as appropriate.

FIGURE R613.5(5)
SIP WALL TO WALL ~~BALLOON~~ HANGING FLOOR FRAME CONNECTION ~~(I-Joist floor shown for Illustration only)~~



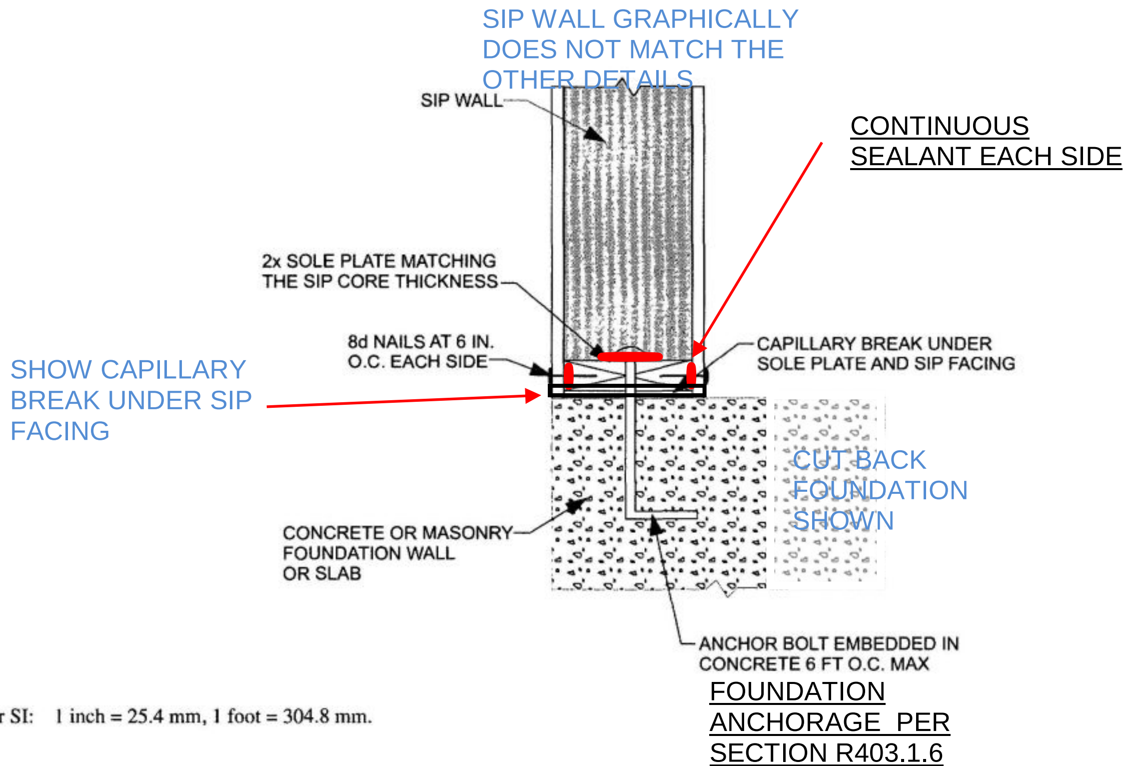
For SI: 1 inch = 25.4 mm.

Notes:

1. Top plates shall be continuous over header.
2. Lower 2x top plate shall have a width equal to the SIP core width and shall be recessed into the top edge of the panel. Cap plate shall be placed over the recessed top plate and shall have a width equal to the SIPs width.
3. SIP facing surfaces shall be nailed to framing and cripples with 8d common or galvanized box nails spaced 6 inches on center.
4. ~~Galvanized nails shall be hot-dipped or tumbled. Framing shall be attached in accordance to Section R602.3(1) unless otherwise provide for in Section R613.~~

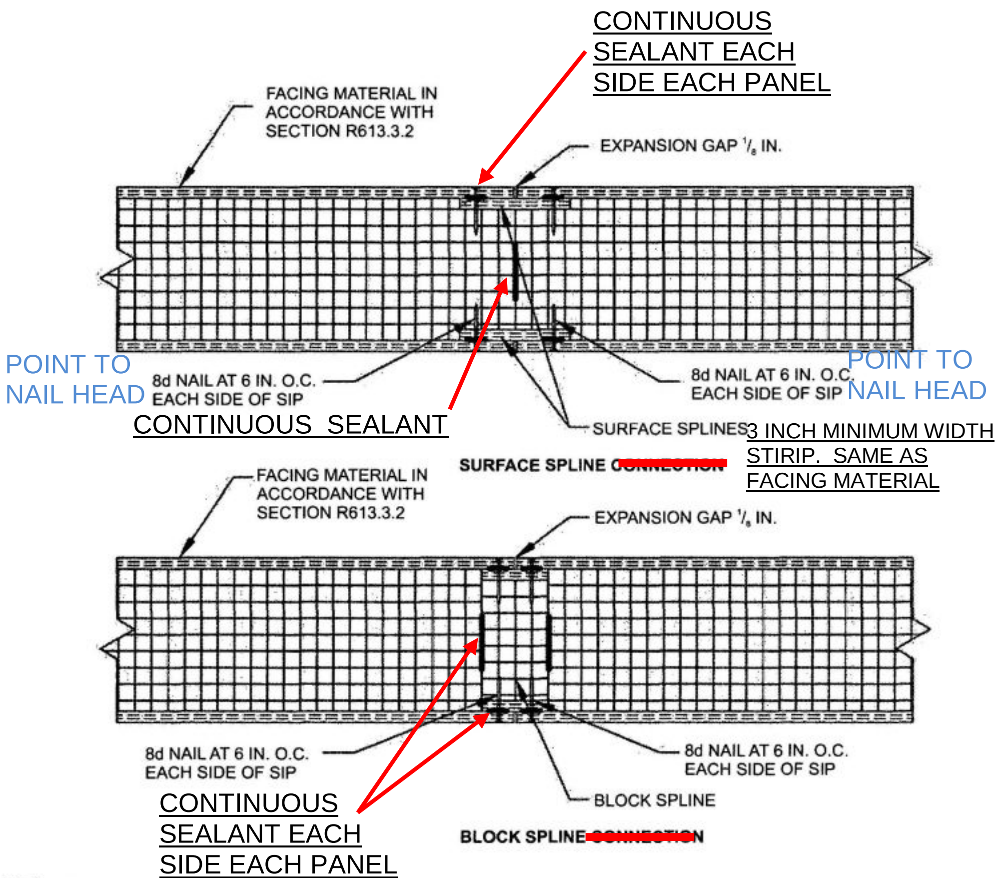
ALL

FIGURE R613.5.1
SIP WALL FRAMING CONFIGURATION



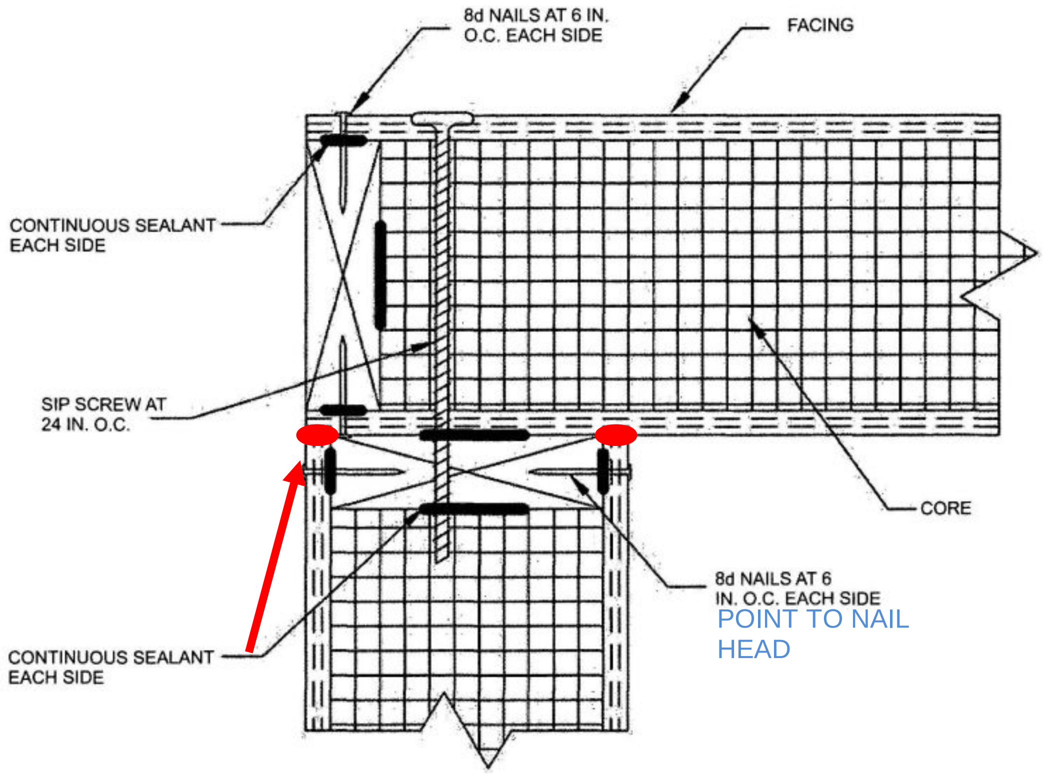
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R613.5.2
SIP WALL TO CONCRETE SLAB ~~FOR~~ FOUNDATION WALL ATTACHMENT



For SI: 1 inch = 25.4 mm.

FIGURE ~~R613.8~~R613.5.3
TYPICAL SIP WALL PANEL TO PANNEL CONNECTION DETAILS ~~FOR VERTICAL IN-PLANE JOINTSPANEL-TO-PANEL CONNECTION~~



For SI: 1 inch = 25.4 mm.

FIGURE ~~R613.9~~R613.5.4
SIP CORNER FRAMING DETAIL

TABLE R613.~~10~~8
MAXIMUM SPANS FOR ~~117/8 INCH DEEP~~ SIP HEADERS (feet)[a, b]

LOAD CONDITION	GROUND SNOW LOAD (psf)	Building width (feet)[c]				
		24	28	32	36	40
Supporting roof only	20	4	4	4	~~4~~ 2	2
	30	4	4	~~4~~ 2	2	2
	50	2	2	2	2	2
	70	2	2	2	N/A	N/A
Supporting roof and one-story	20	2	2	N/A	N/A	N/A
	30	2	2	N/A	N/A	N/A
	50	2	N/A	N/A	N/A	N/A
	70	N/A	N/A	N/A	N/A	N/A

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
N/A = ~~Not Applicable.~~ Design required.
a. Deflection criterion: L/240
b. Design load assumptions:
~~Maximum deflection criterion: *L*/360.~~
~~Maximum r~~Roof dead load: 10 psf.
~~Maximum c~~Ceiling dead load: 5 psf.
~~Maximum s~~Second floor live load: 30 psf.
~~Maximum s~~Second floor dead load: 10 psf.
~~Maximum s~~Second floor dead load from walls: 10 psf.
c. The table provides for roof slopes between 3:12 and 12:12
d. Maximum Roof overhang 24 inches (610mm).
e. Building width is in the direction of horizontal framing members supported by the header.

Reason: The proposal is a reorganization of the entire Structural Insulated Panels (SIPs) section. The intention is to add clarity to the proposal as it is currently written. The original SIP language was based on the HUD document Prescriptive Method for Structural Insulated Panels (SIPs) Used In Wall Systems In Residential Construction. Since the inclusion of SIPs in the IRC, there have been several changes that have revised the SIP requirements, however, in some instances the changes have do not match the language used in other materials (wood, cold formed steel, ect.). Proposed changes are intended to bring the SIPs provisions more in line with the other sections of the IRC.

To Summarize the changes:

- R613.3.1 changes to the core requirements – to bring the specifications from the Structural Insulated Panel Association specifications into the code
- R613.3.7 add thermal barrier requirements from the HUD document into section R613.
- R613.5.3/4 move the connection requirements into the section designated for connections.
- R613.10.1 – remove wood structural headers, since section R602.7 already includes wood structural headers. This section is redundant and not necessary.
- Table 613.5 (1) & (2) – add footnotes to match the presentation of the wood and cold form steel tables. Changes to the values are to bring the thickness from the original HUD document back to the tables.
- Figure changes are editorial and take into account the original HUD and the current Structural Insulated Panel Association detail requirements.
- Table 613.10 header span table, based on the allowable HUD header SIP capacities, revise the allowable spans.

Bibliography: *Prescriptive Method for Structural Insulated Panels (SIPs) Used In Wall Systems In Residential Construction,* U.S. Department of Housing and Urban Development Office of Policy Development and Research, Washington, DC, 2007.

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

R613.3.1-RB-KERR.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based upon the proponent's request for disapproval. Also, the committee's previous action on RB344-13 clarified some issues. The proponent will work with industry and bring back a public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Stephen Kerr S.E., Josephson Werdowatz and Associates, Inc., representing self, and Edward L. Keith, P.E., APA – The Engineered Wood Association, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R613
STRUCTURAL INSULATED PANEL WALL
CONSTRUCTION

R613.1 General. Structural insulated panel (SIP) walls shall be designed in accordance with the provisions of this section. When the provisions of this section are used to design structural insulated panel walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the *jurisdiction* having authority.

R613.2 Applicability limits. The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum ultimate design wind speed (V_{ult}) of ~~120~~ 155 miles per hour (~~54~~ 69 m/s), Exposure A or B or ~~110~~ 140 miles per hour (~~49~~ 63 m/s) Exposure C, and a maximum ground snow load of 70 pounds per foot (3.35 kPa), and Seismic Design Categories A, B, and C.

R613.3 Materials. SIPs shall comply with the following criteria:

R613.3.1 Core. The core material shall be composed of foam plastic insulation meeting one of the following requirements:

1. Expanded Polystyrene (EPS) in accordance with ASTM C 578 and have a minimum density of 0.90 pounds per cubic feet (14.4 kg/m^3); or
2. Extruded polystyrene (XPS) in accordance with ASTM C 578 and have a minimum density of 1.3 pounds per cubic feet (~~14.4~~ 20.8 kg/m^3); or
3. Polyurethane meeting the physical properties shown in Table R613.3.1, or;
4. An *approved* alternative.

All cores shall meet the requirements of Section R316.

TABLE R613.3.1
MINIMUM PROPERTIES FOR POLYURETHANE INSULATION USED AS SIPS CORE

PHYSICAL PROPERTY	POLYURETHANE
Density, core nominal (ASTM D 1622)	2.2 lb/ft^3
Compressive resistance at yield or 10% deformation, whichever occurs first (ASTM D 1621)	19 psi (perpendicular to rise)
Flexural strength, min. (ASTM C 203)	30 psi
Tensile strength, min. (ASTM D 1623)	35 psi
Shear strength, min. (ASTM C 273)	25 psi
Substrate adhesion, min. (ASTM D 1623)	22 psi
Water vapor permeance of 1.00-in. thickness, max. (ASTM E 96)	2.3 perm
Water absorption by total immersion, max. (ASTM C 272)	4.3% (volume)
Dimensional stability (change in dimensions), max. [ASTM D 2126 (7 days at 158°F/100% humidity and 7 days at -20°F)]	2%

For SI: 1 pound per cubic foot = 16.02 kg/m^3, 1 pound per square inch= 6.895 kPa, °C = [(°F) - 32]1.8.

R613.3.2 Facing. Facing materials for SIPs shall be wood structural panels conforming to DOC PS 1 or DOC PS 2, each having a minimum nominal thickness of 7/16 inch (11 mm) and shall meet the additional minimum properties specified in Table R613.3.2. Facing shall be identified by a grade mark or certificate of inspection issued by an *approved* agency.

TABLE R613.3.2
MINIMUM PROPERTIES[a] FOR ORIENTED STRAND BOARD FACER MATERIAL IN SIP WALLS

Thickness (inch)	Product	Flatwise Stiffness[b] (lbf-in2/ft)		Flatwise Strength[c] (lbf-in/ft)		Tension[c] (lbf/ft)		Density[d] (pcf)
		Along	Across	Along	Across	Along	Across	
7/16	Sheathing	55,600	16,500	1,040	460	7,450	5,800	34

For SI: 1 inch = 25.4 mm, 1 lbf-in^2/ft = 9.415 x 10^{-6} kPa/m, 1 lbf-in/ft = 3.707 x 10^{-4} kN/m, 1 lbf/ft = 0.0146 N/mm, 1 pound per cubic foot = 16.018 kg/m^3.

a. Values listed in Table R613.3.2 are qualification test values and are not to be used for design purposes.
b. Mean test value shall be in accordance with Section 7.6 of DOC PS 2.
c. Characteristic test value (5th percent with 75% confidence).
d. Density shall be based on oven-dry weight and oven-dry volume.

R613.3.3 Adhesive. Adhesives used to structurally laminate the foam plastic insulation core material to the structural wood factors shall conform to ASTM D 2559 or *approved* alternative specifically intended for use as an adhesive used in the lamination of structural insulated panels. Each container of adhesive shall bear a *label* with the adhesive manufacturer's name, adhesive name and type and the name of the quality assurance agency.

R613.3.4 Lumber. The minimum lumber framing material used for SIPs prescribed in this document is NLGA graded No. 2 Spruce-pine-fir. Substitution of other wood species/grades that meet or exceed the mechanical properties and specific gravity of No. 2 Spruce-pine-fir shall be permitted.

R613.3.5 SIP screws. Screws used for the erection of SIPs as specified in Section R613.5 shall be fabricated from steel, shall be provided by the SIPs manufacturer and shall be sized to penetrate the wood member to which the assembly is being attached by a minimum of 1 inch (25 mm). The screws shall be corrosion resistant and have a minimum shank diameter of 0.188 inch (4.7 mm) and a minimum head diameter of 0.620 inch (15.5 mm).

R613.3.6 Nails. Nails specified in Section R613 shall be common or galvanized box unless otherwise stated.

R613.3.7 Thermal Barrier. SIP walls shall be separated from the interior of a building by an *approved* thermal barrier in accordance with section R316.4.

R613.4 SIP wall panels. SIPs shall comply with Figure R613.4 and shall have minimum panel thickness in accordance with Tables R613.5(1) and R613.5(2) for above-grade walls. All SIPs shall be identified by grade mark or certificate of inspection issued by an *approved* agency

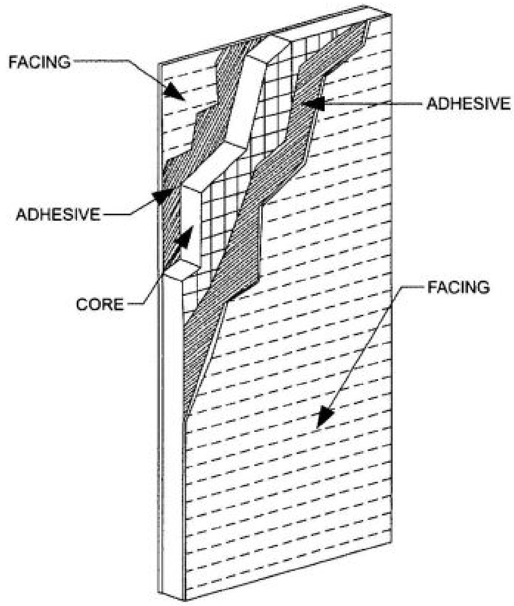


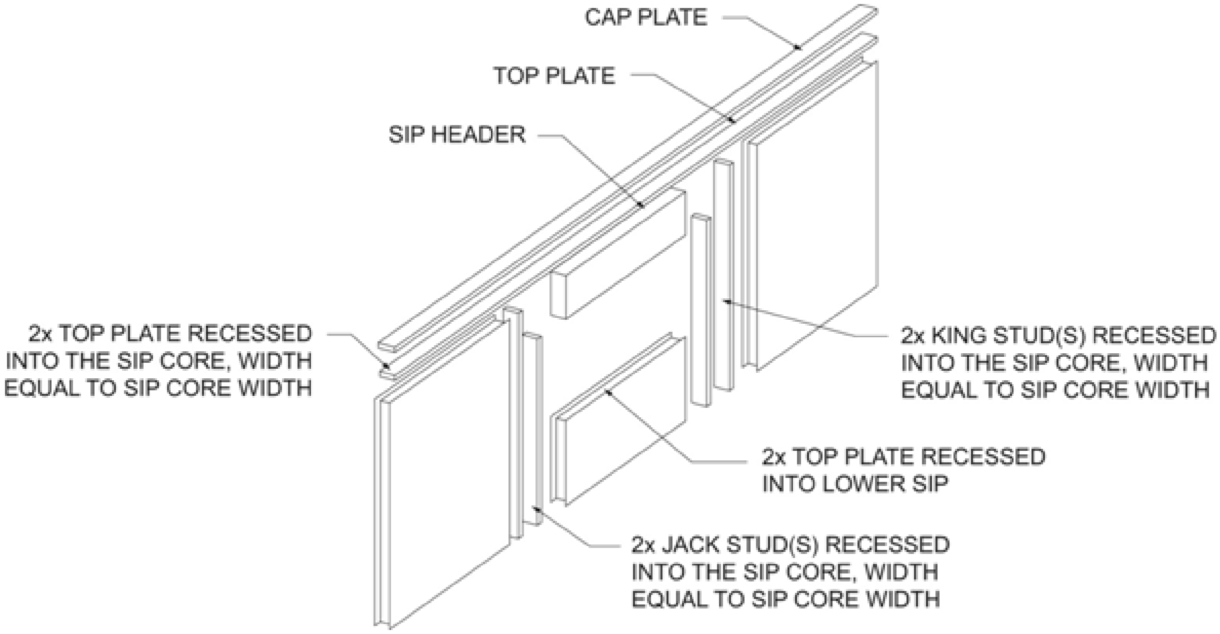
FIGURE R613.4
SIP WALL PANEL

R613.4.1. Labeling. All panels shall be identified by grade mark or certificate of inspection issued by an *approved* agency. Each (SIP) shall bear a stamp or *label* with the following minimum information:

1. Manufacturer name/logo.
2. Identification of the assembly.
3. Quality assurance agency.

R613.5 Wall construction. Exterior walls of SIP construction shall be designed and constructed in accordance with the provisions of this section, Tables R613.5(1) and R613.5(2), and Figures R613.5(1) through R613.5(6). SIP walls shall be fastened to other wood building components in accordance with Tables R602.3(1) through R602.3(4).

Framing shall be attached in accordance with Table R602.3(1) unless otherwise provided for in Section R613.



For SI: I inch = 24.4 mm.

Note:
1. Top plates shall be continuous over header
2. Lower 2 x top plate shall have a width equal to the SIP core width and shall be recessed into the top edge of the panel. Cap plate shall be placed over the recessed top plate and shall have a width equal to the SIP width.
3. SIP facing surface shall be nailed to all framing and cripples with 8d common or galvanized box nails spaced 6 inches on center.

FIGURE R613.5(1)
SIP WALL FRAMING CONFIGURATION

R613.5.1 Top plate connection. SIP walls shall be capped with a double to plate installed to provide overlapping at corner, intersections and splines in accordance with Figure R613.5(1). The double top plates shall be made up of a single 2 by top plate having a width equal to the width of the panel core, and shall be recessed into the SIP below. Over this top plate a cap plate shall be placed. The cap plate width shall match the SIP thickness and overlap the facers on both sides of the panel. End joints in top plates shall be offset at least 24 inches (610 mm).

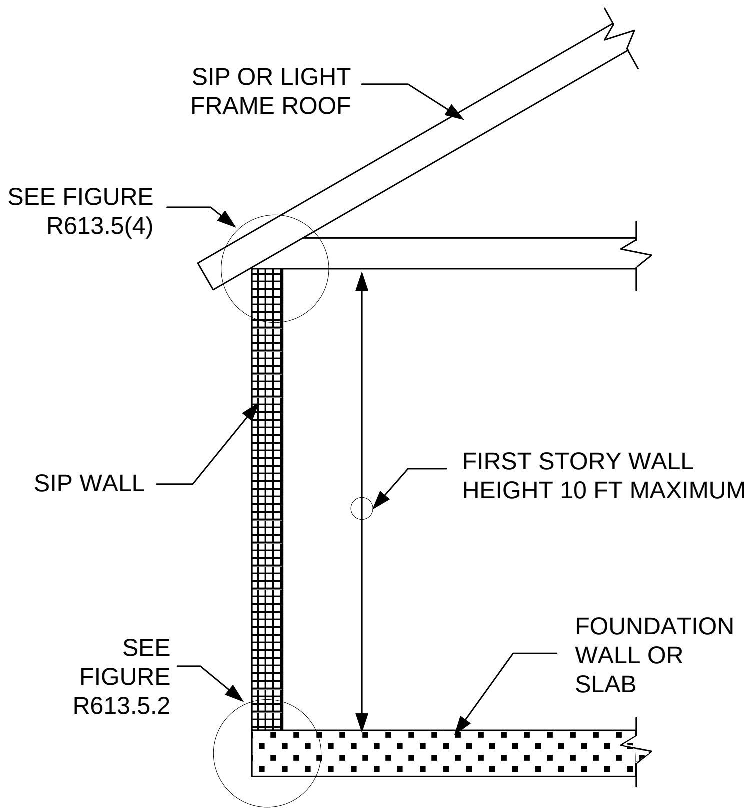


FIGURE R613.5(~~1~~2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

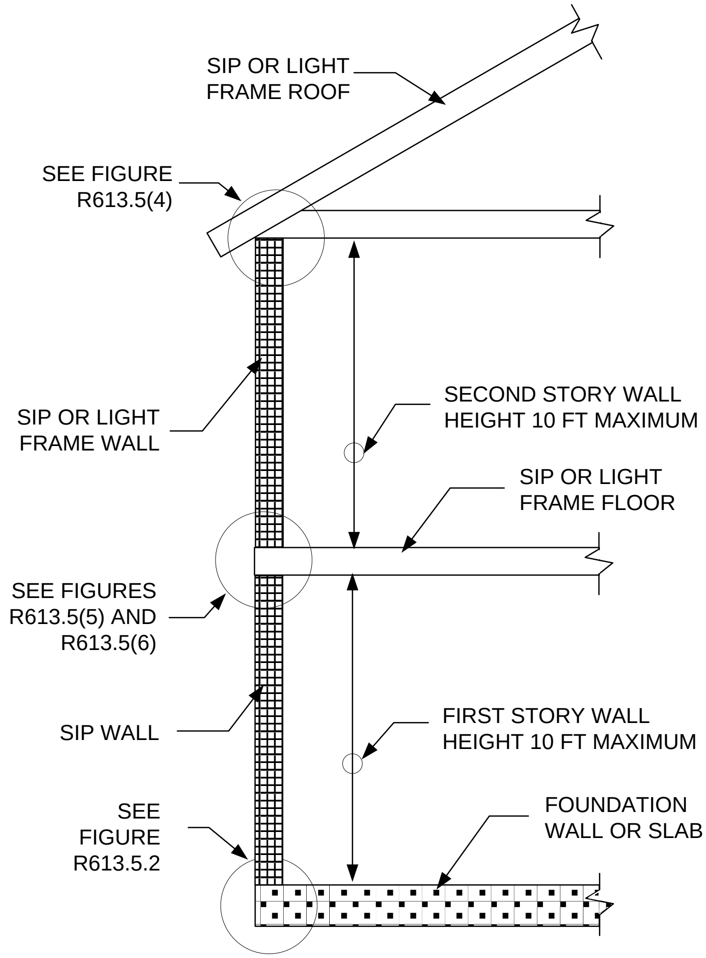


FIGURE R613.5(~~2~~3)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

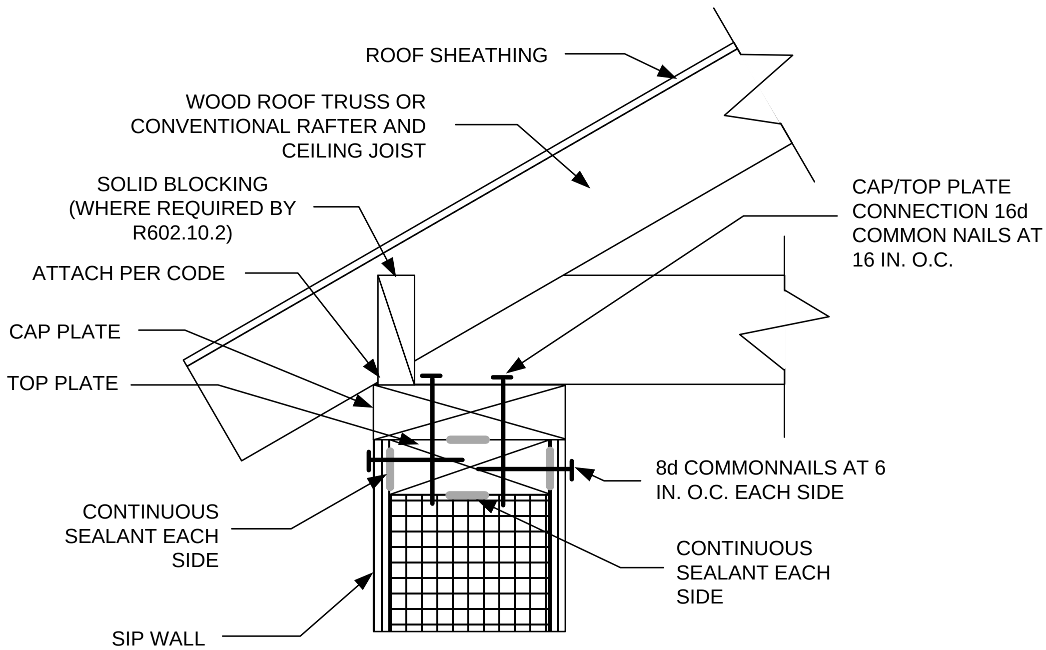
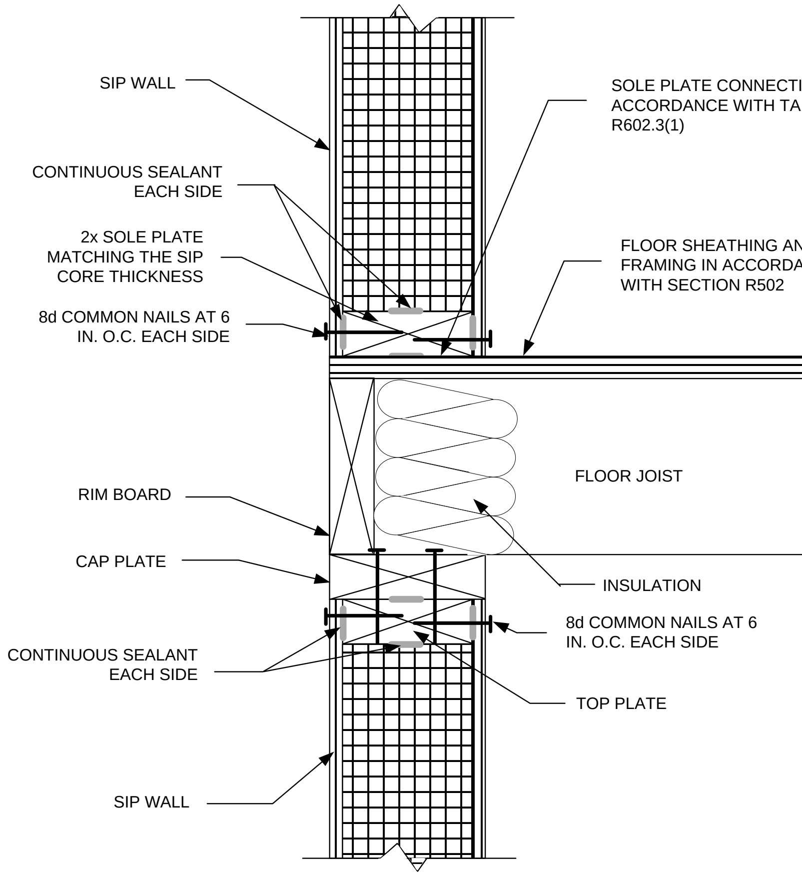
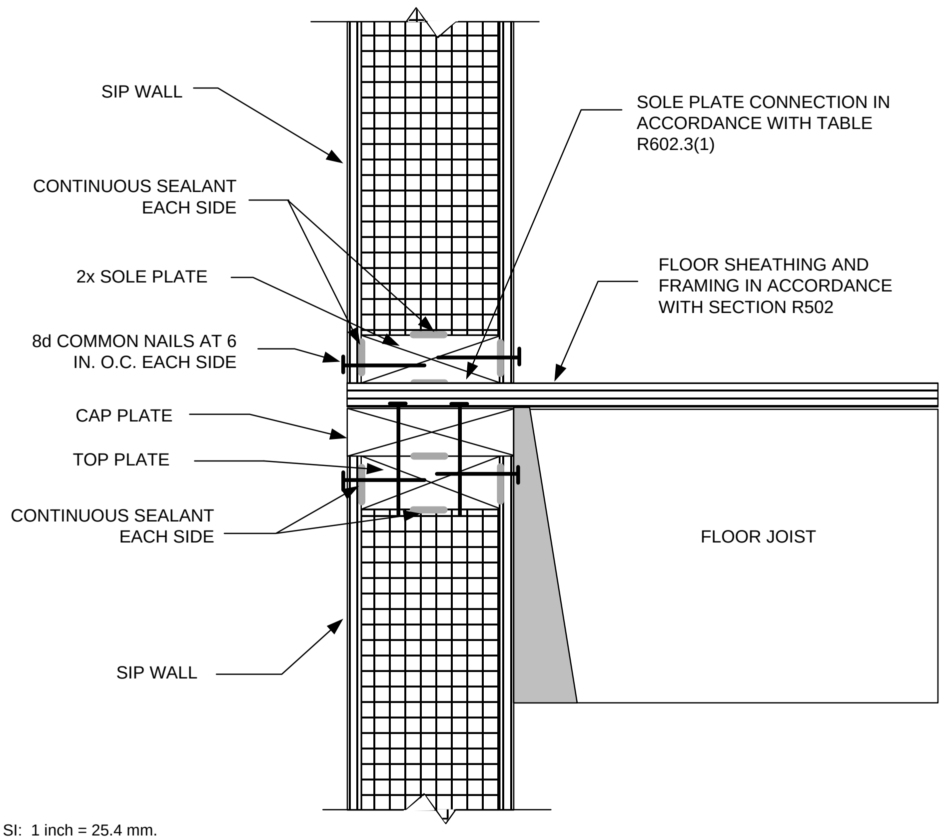


FIGURE R613.5(~~3~~4)
TRUSS OR CONVENTIONAL RAFTER TO TOP PLATE CONNECTION



For SI: 1 inch = 25.4 mm.
Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2) as appropriate.

FIGURE R613.5(45)
SIP WALL-TO-WALL PLATFORM FRAME CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2) as appropriate.

FIGURE R613.5(~~5~~6)
SIP WALL-TO-WALL HANGING-FLOOR FRAME CONNECTION

R613.5.2 Bottom (sole) plate connection. SIP walls shall have full bearing on a sole plate having a width equal to the nominal width of the foam core. When SIP walls are supported directly on continuous foundations, the wall wood sill plate shall be anchored to the foundation in accordance with Figure R613.5.2 and Section R403.1.

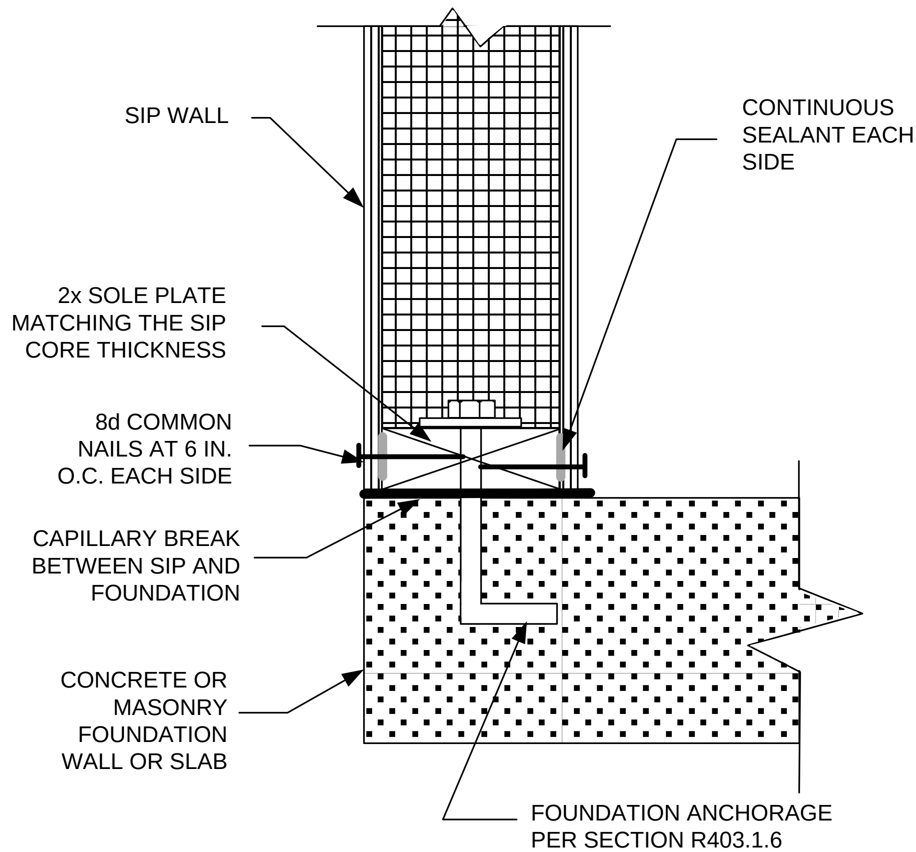
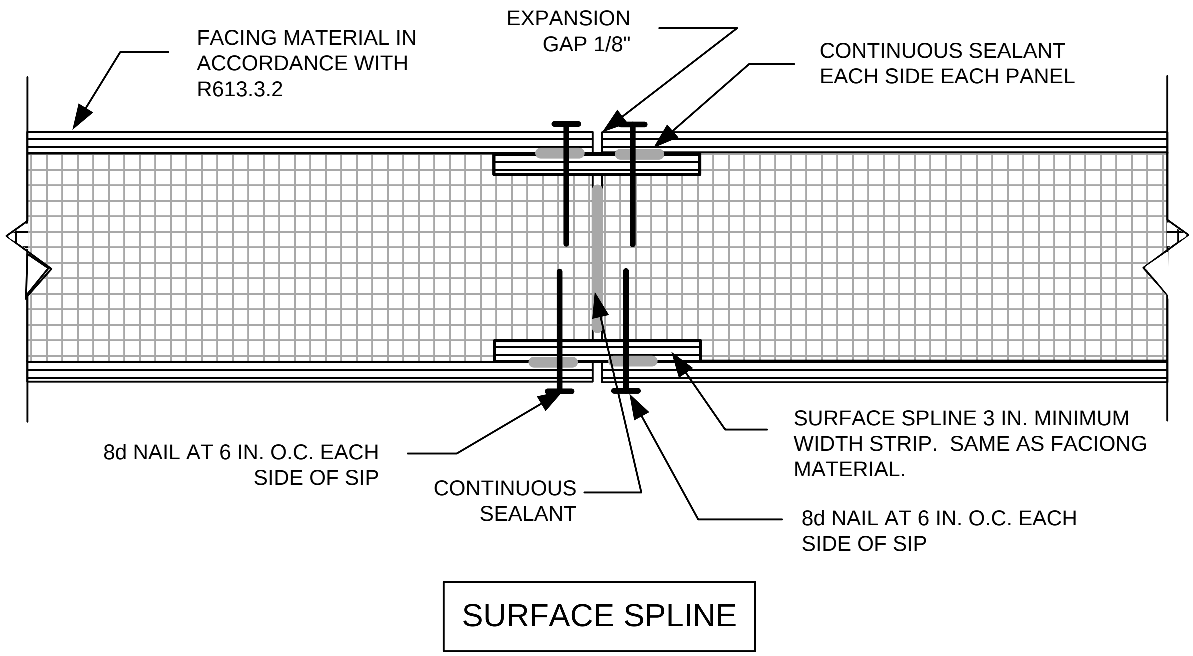


FIGURE R613.5.2
SIP WALL-TO-CONCRETE SLAB OR FOUNDATION WALL ATTACHMENT

R613.5.3 Panel to panel connection. SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.5.3 or by other *approved* methods.



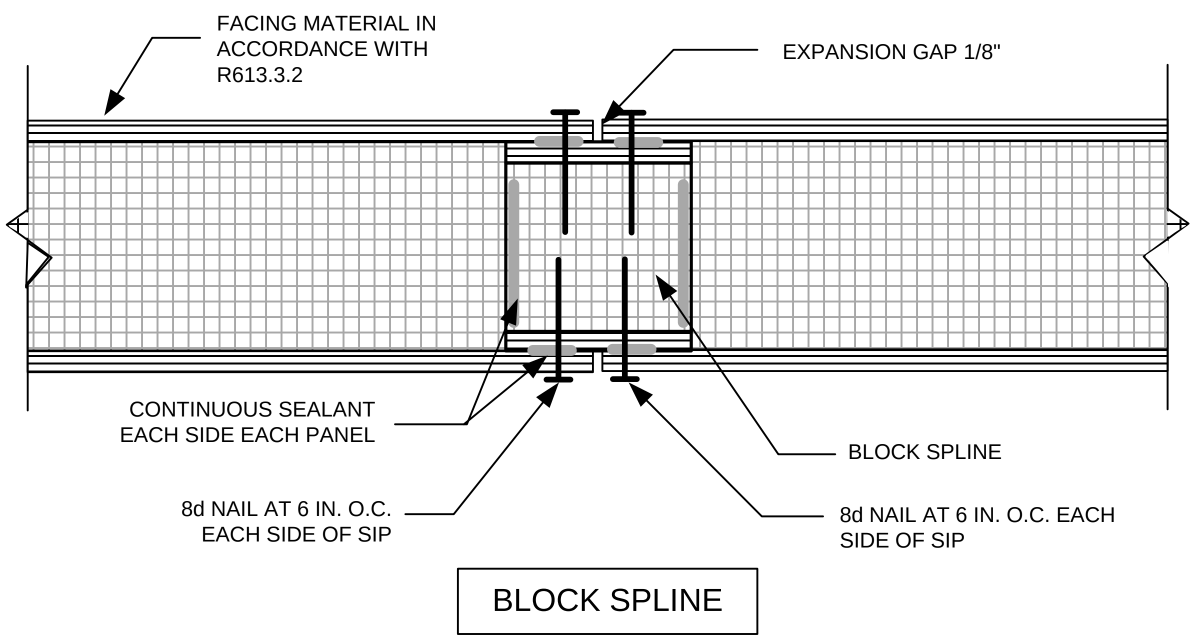


FIGURE R613.5.3
TYPICAL SIP WALL PANEL-TO-PANEL CONNECTION DETAILS

R613.5.4 Corner framing. Corner framing of SIP walls shall be constructed in accordance with Figure R613.5.4.

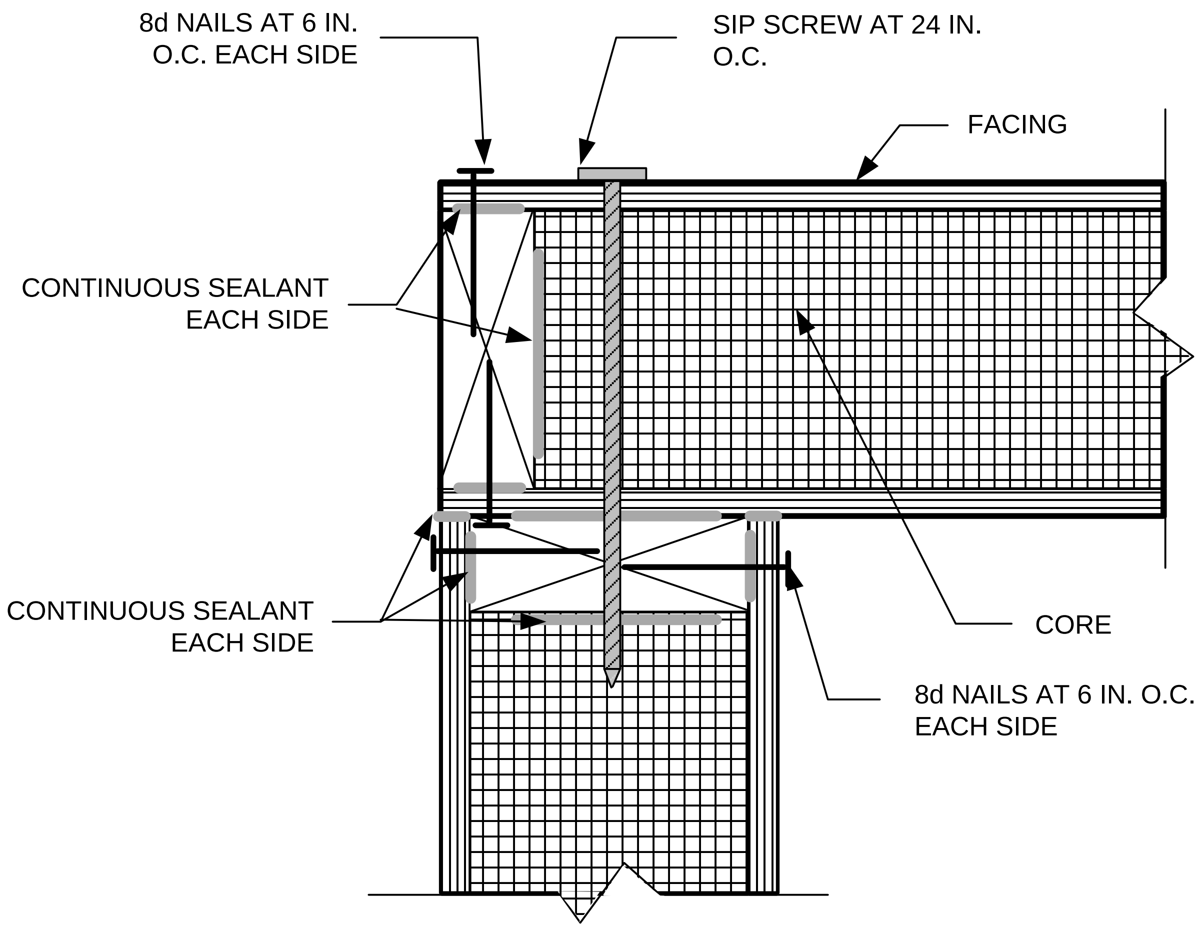


FIGURE R613.5.4
SIP CORNER FRAMING DETAIL

R613.5.5 Wall bracing. SIP walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing for purposes of computing required bracing. SIP walls shall meet the requirements of Section R602.10.4.2 except that SIPs corners shall be fabricated as shown in Figure R613.9. When SIP walls are used for wall bracing, the SIP bottom plate shall be attached to wood framing below in accordance with Table R602.3(1).

R613.6 Interior load-bearing walls. Interior load-bearing walls shall be constructed as specified for exterior walls.

R613.7 Drilling and notching. The maximum vertical chase penetration in SIPs shall have a maximum side dimension of 2 inches (51 mm) centered in the panel core. Vertical chases shall have a minimum spacing of 24-inches (610 mm) on center. Maximum of two horizontal chases shall be permitted in each wall panel, one at 14 inches (360 mm) from the bottom of the panel and one at mid-height of the wall panel. The maximum allowable penetration size in a wall panel shall be circular or rectangular with a maximum dimension of 12 inches (305 mm). Overcutting of holes in facing panels shall not be permitted.

R613.8 Headers. SIP headers shall be designed and constructed in accordance with Table R613.8 and Figure R613.5.1. SIPs headers shall be continuous sections without splines. Headers shall be at least 11 7/8 inches (302 mm) deep. Headers longer than 4 feet (1219 mm) shall be constructed in accordance with Section R602.7.

R613.8.1 Wood structural panel box headers. Wood structural panel box headers shall be allowed where SIP headers are not applicable. Wood structural panel box headers shall be constructed in accordance with Figure R602.7.2 and Table R602.7.2.

~~TABLE R613.5(1)~~
~~MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)~~~~[a,b,c]~~

			~~Building Width (ft)~~~~[d]~~														
~~Wind Speed (3-sec gust)~~		~~Ground Snow Load (psf)~~	~~24~~			~~28~~			~~32~~			~~36~~			~~40~~		
			~~Wall Height (feet)~~			~~Wall Height (feet)~~			~~Wall Height (feet)~~			~~Wall Height (feet)~~			~~Wall Height (feet)~~		
~~Exp A/B~~	~~Exp. C~~		~~8~~	~~9~~	~~10~~	~~8~~	~~9~~	~~10~~	~~8~~	~~9~~	~~10~~	~~8~~	~~9~~	~~10~~	~~8~~	~~9~~	~~10~~
~~85~~	—	~~20~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~30~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~50~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~70~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
~~100~~	~~85~~	~~20~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~30~~	~~4.5~~	~~4.5.~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~50~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~70~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~6.5~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5
~~110~~	~~100~~	~~20~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~
		~~30~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~6.5~~ 4.5
		~~50~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~4.5~~	~~6.5~~ 4.5	~~4.5~~	~~4.5~~	~~6.5~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5
		~~70~~	~~4.5~~	~~4.5~~	~~6.5~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~6.5~~	~~N/A~~ 4.5	~~4.5~~	~~N/A~~ 4.5	~~N/A~~
~~120~~	~~110~~	~~20~~	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5
		~~30~~	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~6.5~~ 4.5	~~N/A~~ 4.5
		~~50~~	~~4.5~~	~~4.5~~	~~N/A~~ 4.5	~~4.5~~	~~6.5~~ 4.5	~~N/A~~ 4.5	~~4.5~~	~~N/A~~ 4.5	~~N/A~~ 4.5	~~4.5~~	~~N/A~~ 4.5	~~N/A~~ 4.5	~~4.5~~	~~N/A~~ 4.5	~~N/A~~ 4.5
		~~70~~	~~4.5~~	~~N/A~~ 4.5	~~N/A~~ 4.5	~~4.5~~	~~N/A~~ 4.5	~~N/A~~ 4.5	~~4.5~~	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5	~~N/A~~ 4.5	~~N/A~~ 4.5	~~N/A~~ 6.5

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

~~a. N/A = Design required.~~
~~b. Deflection criterion: L/240~~
~~c. Design load assumptions:~~
~~Roof dead load: 10 psf.~~
~~Ceiling dead load: 5 psf.~~
~~Wind loads based on Table R301.2 (2).~~
~~Strength axis of facing materials applied vertically.~~
~~d. Building width is in the direction of horizontal framing members supported by the header.~~

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)[a,b,c]

Building Width (ft)[d]																	
Wind Speed (3 –sec gust)		Ground Snow Load (psf)	24			28			32			36			40		
Exp A/B	Exp. C		Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	N/A 4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 6.5	4.5 6.5	N/A 6.5	N/A 6.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5
		50	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5
		70	4.5	4.5	N/A 4.5	4.5	6.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A	N/A
110	100	20	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5
		30	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5
		50	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A
		70	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A	N/A 6.5	N/A	N/A	N/A	N/A	N/A
120	110	20	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A
		30	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A	N/A 6.5	N/A 6.5	N/A
		50	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A	N/A 6.5	N/A	N/A	N/A	N/A	N/A
		70	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A	N/A 6.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

a. N/A = Design required.

b. Deflection criterion: L/240

c. Design load assumptions:

Roof dead load: 10 psf.
Ceiling dead load: 5 psf.
Second floor live load: 30 psf.
Second floor dead load: 10 psf.
Second floor dead load from walls: 10 psf.
Wind loads based on Table R301.2 (2).

Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.

TABLE R613.5(1)

MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)[a,b]

Ultimate Design Wind Speed V_{ult} (mph)		Snow Load (psf)	Building Width (ft)														
			24			28			32			36			40		
Exp. B	Exp. C		Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
110	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	6.5
115	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
130	110	20	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
		30	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	4.5	DR
		50	4.5	4.5	DR	4.5	4.5	DR	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR
		70	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR
140	120	20	4.5	6.5	DR	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR
		30	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR
		50	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8mm; 1 pound per square foot = 0.0479 kPa.

a. Design assumptions:
   Maximum deflection criteria: L/240.
   Maximum roof dead load: 10 psf.
   Maximum roof live load: 70 psf.
   Maximum ceiling dead load: 5 psf.
   Maximum ceiling live load: 20 psf.
   Wind loads based on Table R301.2 (2).
   Strength axis of facing material applied vertically.
   DR indicates Design Required.

b. Building width is in the direction of horizontal framing members supported by the wall.

TABLE R613.5(2)

MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)[a,b]

Ultimate Design Wind Speed V_{ult} (mph)		Snow Load (psf)	Building Width (ft)														
			24			28			32			36			40		
Exp. B	Exp. C		Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
110	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	6.5	DR
		50	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR
		70	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
115	--	20	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	DR	DR
		30	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR
		50	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR
		70	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
120	--	20	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR
		30	4.5	4.5	DR	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR	DR	DR	DR
		50	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
		70	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
130	110	20	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
		30	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		50	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8mm; 1 pound per square foot = 0.0479 kPa.

a. Design assumptions:
   Maximum deflection criteria: L/240.
   Maximum roof dead load: 10 psf.
   Maximum roof live load: 70 psf.
   Maximum ceiling dead load: 5 psf.
   Maximum ceiling live load: 20 psf.
   Maximum second floor dead load: 10 psf.
   Maximum second floor live load: 30 psf.
   Maximum second floor dead load from walls: 10 psf.
   Maximum first floor dead load: 10 psf.
   Maximum first floor live load: 40 psf.
   Wind loads based on Table R301.2 (2).
   Strength axis of facing material applied vertically.
   DR indicates Design Required.

b. Building width is in the direction of horizontal framing members supported by the wall.

TABLE R613.8
MAXIMUM SPANS FOR 11-7/8 INCH OR DEEPER SIP HEADERS (feet)[a,b]

LOAD CONDITION	GROUND SNOW LOAD (psf)	Building width (feet)[e]				
		24	**28**	**32**	**36**	**40**
Supporting roof[c,d] only	20	4	4	4	2	2
	30	4	4	2	2	2
	50	2	2	2	2	2
	70	2	2	2	~~NA~~ DR	~~NA~~ DR
Supporting roof and one-story	20	2	2	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR
	30	2	2	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR
	50	2	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR
	70	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR	~~NA~~ DR

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.
~~N/A = Design required.~~
~~a. Deflection criterion: L/240~~
~~b. Design load assumptions:~~
~~Roof dead load: 10 psf.~~
~~Ceiling dead load: 5 psf.~~
~~Second floor live load: 30 psf.~~
~~Second floor dead load: 10 psf.~~
~~Second floor dead load from walls: 10 psf.~~
~~c. The table provides for roof slopes between 3:12 and 12:12~~
~~d. Maximum Roof overhang 24 inches (610mm).~~
~~e. Building width is in the direction of horizontal framing members supported by the header.~~
a. Design assumptions:
Maximum deflection criteria: L/240.
Maximum roof dead load: 10 psf.
Maximum ceiling dead load: 5 psf.
Maximum ceiling live load: 20 psf.
Maximum second floor dead load: 10 psf.
Maximum second floor live load: 30 psf.
Maximum second floor dead load from walls: 10 psf.
Maximum first floor dead load: 10 psf.
Wind loads based on Table R301.2 (2).
Strength axis of facing material applied vertically.
DR indicates Design Required.
b. Building width is in the direction of horizontal framing members supported by the header.
c. The table provides for roof slopes between 3:12 and 12:12.
d. The maximum roof overhang is 24 inches (610 mm).

Commenter's Reason: The proponent and APA requested disapproval of this proposal at the mid-year meeting to permit the proponent and APA time together to correct some issues with the proposal as submitted. This public comment, submitted by the proponent of the original code change AND co submitted by APA is the result of our collaboration. While the section is long the actual Public Comment Changes are actually few and are described below:

- Section R613.3.1 – Corrected the metric equivalent to 1.3 pounds per cubic ft.
- Section R613.5.1 - A charging statement was added to Section R613.5.1 to recognize Figure R613.5 and Figure R613.5 was renumbered to R613.5(1). Original Figures R613.5(1) through R613.5(5) were renumbered accordingly. Annotations in affected figures have been changed to reflect the proposed numbering system.
- Section R613.8.1 – Deleted by the original proposal, this section was re-added by this Public Comment.
- Tables R613.5(1) and R613.5(2) - Were deleted and replaced by the appropriate Ultimate Design Wind Speed Tables provided in RB271.
- Tables R613.5(1) and R613.5(2) older footnotes inadvertently deleted in the 2009 IRC were re-added per RB344.
- Footnote b was added to Tables R613.5(1) and (2), and R613.8 to clarify the intent of the tables.
- Table R613.8 the limitation on the minimum depth of the header was re-added to the title of the table.
- Note that all figures have been redrawn and reformatted to provide a cleaner, more easily understood IRC.

We encourage the code body to accept this public comment providing requisite clarity in addition to updating the provisions to reflect ASCE 7-10 with respect to Ultimate Design Wind Speed.

RB347-13
Final Action: AS AM AMPC____ D

RB348-13
R614 (NEW)

Proposed Change as Submitted

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Add new text as follows:

SECTION R614
IMPACT PROTECTIVE SYSTEMS

R614.1 Safety factor. Impact protective systems shall be tested at 1.5 times the design pressure (positive or negative) expressed in pounds per square feet as determined by the Section R301.2.1.1 of this code for which the specimen is to be tested.

R614.1.1 Labels required. Impact protective systems shall be approved and shall be tested in accordance with Section R301.2.1.2 and shall be labeled as conforming to the standards listed in Section R301.2.1.2 and in accordance with the provisions of this section. Impact resistant glazing shall be labeled in accordance with Section R612.6.1

R614.2 Labels. A permanent label shall be provided on all impact protective systems.

Exception: Wood structural panels permitted at section R301.2.1.2.

R614.2.1 Label information required. The following information shall be included on the labels on impact protective systems:

1. The manufacturer's name and address,
2. The approved testing and labeling agency, and
3. The rated wind design pressure, positive and negative.

Exception: Impact resistant glazing shall comply with Section R612.6.1

R614.3 Location of label. The location of the label on the impact protective systems shall be as follows:

1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.
2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.
3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the impact protective system.
4. Panels: For metal and plastic panels the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the manufacturer and shall face the exterior or outside.
5. Framed products: The label shall be on the side or bottom facing the exterior or outside.
6. Labels on all other products shall face the exterior or outside.

Exception: Labels for impact resistant glazing shall comply with Section R612.6.1

R614.4 Installation. All impact protective systems shall be installed in accordance with the manufacturer's installation instructions. Installation instructions shall be provided and shall be available to inspection personnel on the job site.

Reason: Similar provisions have been adopted in the Florida Building Code to assist code enforcement personnel in the inspection of impact protective systems. The Garage Door-Window Labeling Work Group was appointed by the Florida Building Commission in response to problems cited by building officials in determining if the proper impact resistant coverings were provided on a job. In many cases it was found the homeowner was not getting a good product or the product was installed incorrectly. The Workgroup consisted of broad range of interests including a number of manufacturers of both impact protective covering systems and impact rated glazing products, contractors, insurance industry representatives, and code enforcement personnel which identified and worked on the issues. This proposal incorporates the recommendations of the Workgroup.

Cost Impact: The cost of providing labels on impact resistant covering products is estimated by the industry as follows:

a. Water Resistant Self-adhering Permanent Labels approximately $0.15 per label. Such labels would most likely be used on Accordion, Roll, Bahama, and Colonial style shutters.

b. Embossed or ink jet labels used on metal and plastic panels would cost approximately $0.05 per label.

There is no added cost to impact resistant glazing products as they are currently required by the code to be labeled.

The industry believes the minor cost involved is by far outweighed by the benefits to the public by providing data permitting inspection personnel and the general public to ascertain the proper impact resistant covering is provided and installed in accordance with the manufacturer's installation instructions.

R614 (NEW)-RB-BELCHER.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The change has too many undefined terms. The labeling requirements are too restrictive and go beyond what is necessary. Also, the standards are not required to be listed on the label.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Joseph D. Belcher, JDB Code Service, Inc, representing International Hurricane Protection Association (IHPA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R614
IMPACT PROTECTIVE SYSTEMS

R614.1 Safety factor. Impact protective systems shall be tested at 1.5 times the design pressure (positive or negative) expressed in pounds per square feet as determined by the Section R301.2.1.1 of this code for which the specimen is to be tested.

R614.1.1 Labels required. Impact protective systems shall be approved and shall be tested in accordance with Section R301.2.1.2 and shall be labeled as conforming to the standards listed in Section R301.2.1.2 and in accordance with the provisions of this section. Impact resistant glazing shall be labeled in accordance with Section R612.6.1

R614.2 Labels. A permanent label shall be provided on all impact protective systems.

Exception: Wood structural panels permitted at section R301.2.1.2.

R614.2.1 Label information required. The following information shall be included on the labels on impact protective systems:

1. The manufacturer's name and address,
2. The approved testing and labeling agency, and
3. The rated wind design pressure, positive and negative.

Exception: Impact resistant glazing shall comply with Section R612.6.1

~~**R614.3 Location of label.** The location of the label on the impact protective systems shall be as follows:~~

~~1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.~~
~~2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.~~

~~3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the impact protective system.~~
~~4. Panels: For metal and plastic panels the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the manufacturer and shall face the exterior or outside.~~
~~5. Framed products: The label shall be on the side or bottom facing the exterior or outside.~~
~~6. Labels on all other products shall face the exterior or outside.~~

~~**Exception:** Labels for impact resistant glazing shall comply with Section R612.6.1~~

R614.4 Installation.
All impact protective systems shall be installed in accordance with the manufacturer's <u>written</u> installation instructions. <u>Written installation instructions shall be provided by the impact protective system manufacturer for each product to be installed.</u> ~~Installation instructions shall be provided and shall be available to inspection personnel on the job site.~~

Commenter's Reason: Safety factor. Currently there are no testing criteria, other than impact and cyclic testing, specified for impact protective systems. The change is an effort to establish a safety factor for the structural testing of such products, i.e. the ability to stay in place during a high wind event. Testimony was provided in Dallas regarding the specified Safety Factor of 1.5 times the design pressure. The safety factor is the same as that specified for the structural testing provisions of ASTM E 330 (ASTM E 330-02 §5.3) and for exterior window and door assemblies not provided for in Section 1710.5.1 in the IBC. (IBC §1710.5.2)

Labels. The code is rife with labeling requirements. Windows, doors, fireplaces, electrical outlets, mechanical equipment, and the list goes on. Labels are a way to ascertain that a manufactured product meets the standards adopted or specified by the code. Impact protective systems are installed to comply with code requirements for opening protection. Without labels, the field inspector, the builder, and the home owner have no way to verify the product installed is the proper product. The label information specified is similar to the requirements for fenestration and is considered the minimum to allow tracking of the product.

Location of label. The location of the label was included to assist inspection personnel by reducing the time needed to find the label on a product. While manufactures of these products are familiar with the various types, testimony was provided at the Code Action Hearings that the types of impact protective systems listed were not defined in the code and persons outside the industry may not be familiar with the nomenclature. The section specifying the label location is stricken to address that concern.

Installation. The intent of the requirement to have manufacturer's installation instructions on the job site was to save the builder a delay for a rejection when the inspection was disapproved because there was nothing for the inspector to use in conducting the inspection of a code requirement. However, I have modified the provision to reflect the manner in which manufacturer's installation instructions are addressed in other parts of the code. (IRC §R612.1Since IRC Section R106.1.2 requires the manufacturer's installation instructions to be on the job site at the time of inspection, that portion of the proposed change is deleted.

Similar provisions have been adopted in the Florida Building Code at the request of code enforcement personnel. Inspectors in the field had no guidelines to inspect by as the impact protective systems are not typically detailed on the plans submitted. The information needed to properly inspect the systems is typically contained in the manufacturer's installation instructions.

RB348-13
Final Action: AS AM AMPC____ D

RB353-13

R302.6, Table R702.3.5

Proposed Change as Submitted

Proponent: Robert Rice, Josephine County, OR, representing Oregon Building Officials Association (structdesigner@yahoo.com)

Revise as follows:

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. Attachment of gypsum board shall comply with Table R702.3.5. Openings in garage walls shall comply with Section R302.5. ~~This~~ The wall separation provisions of Table R302.6 ~~does~~ do not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING[c]
				Nails[a]	Screws[b]	
Application without adhesive						
$^{3}/_{8}$	Ceiling[d]	Perpendicular	16	7	12	13 gage, $1^{1}/_{4}$" long, $^{19}/_{64}$" head; 0.098" diameter, $1^{1}/_{4}$" long, annular-ringed; or 4d cooler nail, 0.080" diameter, $1^{3}/_{8}$" long, $^{7}/_{32}$" head.
	Wall	Either direction	16	8	16	
$^{1}/_{2}$	Ceiling	Either direction	16	7	12	13 gage, $1^{3}/_{8}$" long, $^{19}/_{64}$" head; 0.098" diameter, $1^{1}/_{4}$" long, annular-ringed; 5d cooler nail, 0.086" diameter, $1^{5}/_{8}$" long, $^{15}/_{64}$" head; or gypsum board nail, 0.086″ diameter, 1 $^{5}/_{8}$" long, $^{9}/_{32}$" head.
	Ceiling[d]	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
$^{5}/_{8}$	Ceiling	Either direction	16	7	12	13 gage, $1^{5}/_{8}$" long, $^{19}/_{64}$" head; 0.098" diameter, $1^{3}/_{8}$" long, annular-ringed; 6d cooler nail, 0.092" diameter, $1^{7}/_{8}$" long, ¼" head; or gypsum board nail, 0.0915" diameter, $1^{7}/_{8}$" long, $^{19}/_{64}$" head.
	Ceiling[e]	Perpendicular	24	7	12	
	Type X at garage ceiling beneath habitable rooms	Perpendicular	24	6	6	1 7/8 inches 6d coated nails or equivalent drywall screws.
	Wall	Either direction	24	8	12	13 gage, $1^{5}/_{8}$" long, $^{19}/_{64}$" head; 0.098" diameter, $1^{3}/_{8}$" long, annular-ringed; 6d cooler nail, 0.092" diameter, $1^{7}/_{8}$" long, $^{1}/_{4}$" head; or gypsum board nail, 0.0915" diameter, $1^{7}/_{8}$" long, $^{19}/_{64}$" head.
	Wall	Either direction	16	8	16	
Application with adhesive						
$^{3}/_{8}$	Ceiling[d]	Perpendicular	16	16	16	Same as above for $^{3}/_{8}$" gypsum board

	Wall	Either direction	16	16	24	
$^{1}/_{2}$ or $^{5}/_{8}$	Ceiling	Either direction	16	16	16	Same as above for $^{1}/_{2}$" and $^{5}/_{8}$" gypsum board, respectively
	Ceiling[d]	Perpendicular	24	12	16	
	Wall	Either direction	24	16	24	
Two $^{3}/_{8}$ layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for $^{1}/_{2}$" gypsum board; face ply installed with adhesive
	Wall	Either direction	24	24	24	

For SI: 1 inch = 25.4 mm.

a. For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than $2^{1}/_{2}$ inches apart may be used with the pair of nails spaced 12 inches on center.

b. Screws shall be in accordance with Section R702.3.6. Screws for attaching gypsum board to structural insulated panels shall penetrate the wood structural panel facing not less than $^{7}/_{16}$ inch.

c. Where cold-formed steel framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than $^{5}/_{8}$ inch longer than the gypsum board thickness and shall have ringed shanks. Where the cold-formed steel framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, $13^{1}/_{2}$ gage, $^{15}/_{8}$ inches long, $^{15}/_{64}$-inch head for $^{1}/_{2}$-inch gypsum board; and 6d, 13 gage, $1^{7}/_{8}$ inches long, $^{15}/_{64}$-inch head for $^{5}/_{8}$-inch gypsum board.

d. Three-eighths-inch-thick single-ply gypsum board shall not be used on a ceiling where a water-based textured finish is to be applied, or where it will be required to support insulation above a ceiling. On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board shall be applied perpendicular to framing. When applying a water-based texture material, the minimum gypsum board thickness shall be increased from $^{3}/_{8}$ inch to $^{1}/_{2}$ inch for 16-inch on center framing, and from $^{1}/_{2}$ inch to $^{5}/_{8}$ inch for 24-inch on center framing or $^{1}/_{2}$-inch sag-resistant gypsum ceiling board shall be used.

~~e. Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum $1^{7}/_{8}$ inches 6d coated nails or equivalent drywall screws.~~

Reason: The existing code requires 5/8" Type X gypsum board on garage ceilings when there are habitable rooms above. The general requirement for separations is stated in R302.6 and that section refers to Table R302.6 (shown below) for the specific requirements. The code also has special attachment requirements for this application that are different from other gypsum board attachments. The problem with the current code is that the requirement for the attachment is in a footnote to Table R702.3(5) and is often overlooked. This proposal is to move the requirement for the attachment from the footnote of Table R702.3(5) to the table itself. A sentence is added to R302.6 to point the user to the attachment requirements in Table R702.3(5).

TABLE R302.6
DWELLING/GARAGE SEPARATION

SEPARATION	MATERIAL
From the residence and attics	Not less than $^{1}/_{2}$-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	Not less than $^{5}/_{8}$-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than $^{1}/_{2}$-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than $^{1}/_{2}$-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

In addition, since Section R302.6 refers to the Table that covers both walls and ceilings, language is added to clarify the existing language. The current text says, "This provision does not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall". As currently written, it says the provisions of R302.6 don't apply which is the whole section R302.6. Since R302.6 is scoping in nature and sends the user to Table R702.3(5) for technical requirements this change makes it clear that the ceiling requirements still apply.

This proposal does not change any requirements in the existing code.

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

RB353-13

R702.3.5T-RB-RICE.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The new language will exclude alternative materials.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Robert Rice, CBO, Josephine County Oregon, representing Oregon Building Officials Association, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. ~~Attachment of g~~ Gypsum board used to provide the required separation shall ~~comply~~ be attached in accordance with Table R702.3.5. Openings in garage walls shall comply with Section R302.5. The wall separation provisions of Table R302.6 do not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The existing code requires that the garage be separated in accordance with Table R302.6 as shown in the original proposal. The attachment of gypsum board is also already specified in Table R702.3.5. In the current code, the required attachment of 5/8" Type X gypsum board on garage ceilings is specified in footnote "e" of Table R702.3.5 and is different from the attachment of other 5/8" gypsum board. However, this requirement is often overlooked because it is a footnote to the table. The purpose of the original proposal (and this public comment) is to move this existing fastening requirement from the footnote into the table and make reference to it in R302.6. No change is proposed to the existing requirements.

At the Committee Action Hearings, there was concern expressed, *"The new language will exclude alternative materials".* There are **no new requirements or limitations** in the original proposal or this public comment. The existing requirement in Table R302.6 is, "*Not less than 5/8-inch Type X gypsum board or equivalent"* and is not changed by this proposal.

This public comment re-words the second sentence of R302.6 so it is clearer that the separation may or may not be accomplished with gypsum board which is consistent with the language ("…or equivalent".) in Table R302.6.

This proposal does not change any requirements in the existing code.

RB353-13

Final Action: AS AM AMPC____ D

RB355-13

R702.4.2, Table R702.4.2 (New), Chapter 44

Proposed Change as Submitted

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and Self

Revise as follows:

R702.4.2 Backer Boards **~~Fiber-cement, fiber-mat reinforced cementitious backer units, glass mat gypsum backers and fiber-reinforced gypsum backers.~~** ~~Fiber-cement, fiber mat reinforced cementitious backer units, glass mat gypsum backers or fiber-reinforced gypsum backers in compliance with ASTM C 1288, C 1325, C 1178 or C 1278, respectively, and installed in accordance with manufacturers' recommendations shall be~~ Materials used as backers for wall tile in tub and shower areas and wall panels in shower areas shall be of materials listed in Table R702.4.2, and installed in accordance with the manufacturer's recommendations.

R702.4.2
BACKER BOARD MATERIALS

MATERIAL	STANDARD
Glass mat gypsum backing panel	ASTM C 1178
Fiber-reinforced gypsum panels	ASTM C 1278
Nonabestos fiber-cement backer board	ASTM C 1288 or ISO 8336, Category C
Nonasbestos fiber mat reinforced cementitious backer units	ASTM C 1325

Add new standard to Chapter 44 as follows:

ISO

ISO 8336 Fibre-Cement Flat Sheets – Product Specification and Test Methods

Reason: The current wording is cumbersome for the backer board materials permitted for use in this section. The text is revised to reference permitted backer board materials now defined in new TABLE R702.4.2 where all 4 permitted products would now be listed. This revision also makes the addition of future recognized products to the Code easier by simple addition to the table. Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

IBC Section 2509.2 has, as a result of the Group A IBC Code Hearings, been revised to adopt this format for approved product presentation. The addition of the new referenced ISO standard and "product category" were also approved during the Group A IBC Code Hearings. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed code change is editorial in nature to better clarify and present the backer board products currently recognized in the Code.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R702.4.2-RB-MULDER.doc

Committee Action Hearing Results

For staff analysis of the content of ISO8336 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: Based upon the committee's previous action on RB256-13 and RB257-13. Also, this is consistent with the IBC structural committee action in Group A.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Mulder, Intertek Testing Services NA, Inc., representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R702.4.2 Backer Boards Materials used as backers for wall tile in tub and shower areas and wall panels in shower areas shall be ~~of materials~~ as listed in Table R702.4.2, and installed in accordance with the manufacturer's recommendations.

Commenter's Reason: The proposed editorial change corrects the grammar of the sentence deleting the double use of the word "materials"

RB355-13
Final Action: AS AM AMPC____ D

RB358-13

R702.7, R702.7.1, Table R702.7.1, R702.7.2

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R702.7 Vapor retarders. Vapor retarders as described in Section R702.7.3 shall be provided in accordance with Sections R702.7.1 and R702.7.2 or an approved design using accepted engineering practice for hygrothermal analysis.

R702.7.1 Class I and II Vapor Retarders. Class I or II vapor retarder membranes shall not be provided on the interior face of frame walls in Climate Zones 1 and 2. Class I vapor retarder membranes shall not be provided on the interior face of frame walls in Climate Zones 3 and 4. A Class I or II vapor retarder material ~~are required~~ shall be provided on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4. The appropriate Climate Zone shall be selected in accordance with Table N1101.10

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Conditions where Class III vapor retarders are required in Section R702.7.2.

~~R702.7.1~~R702.7.2 Class III vapor retarders. Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met. Only Class III vapor retarder membranes in accordance with Section R702.7.3 shall be used on the interior face of frame walls where continuous insulation with perm rating of less than 1 perm is applied in accordance with Table R702.7.1 on the exterior side of the frame wall.

~~R702.7.2~~ R702.7.3 Material vapor retarder class. The *vapor retarder class* of any material used as a vapor retarder shall be based on the manufacturer's certified testing or a tested assembly. The following vapor retarder membranes shall be deemed to meet the class specified:

Class I: Sheet polyethylene, nonperforated aluminum foil
Class II: Kraft-faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0.
Class III: Latex or enamel paint.

TABLE R702.7.1
CLASS III VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥2.5 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥3.75 over 2x6 wall
5	Vented cladding over wood structural panels. Vented cladding over fiberboard.

	Vented cladding over gypsum. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥5 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥7.5 over 2x6 wall
6	Vented cladding over fiberboard. Vented cladding over gypsum. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥7.5 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥11.25 over 2x6 wall
7 and 8	~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥10 over 2x4 wall. ~~Insulated sheathing~~ Exterior continuous insulation with R-value ≥15 over 2x6 wall

For SI: 1 pound per cubic foot = 16 kg/m^3.

a. Spray foam with minimum density of 2 lb/ft^3 applied to the interior cavity side of wood structural panels, fiberboard, insulated sheathing or gypsum is deemed to meet the ~~insulated sheathing~~ exterior continuous insulation requirement where the spray foam R-value or the combination of spray foam and exterior continuous insulation R-value meets or exceeds the specified ~~insulated sheathing~~ exterior continuous insulation R-value.

Reason: A similar proposal was approved as submitted for the 2015 IBC (FS 160-12). In this coordinating proposal for the IRC, vapor retarder provisions are identically strengthened to better promote seasonal drying of walls and avoid a "double vapor barrier" condition in combination with a "warm wall" design using insulating sheathing in cold climates. In addition, requirements are clarified to promote proper application and enforcement. For example, provision is added to clarify that low perm vapor retarder membranes on the interior face of walls shall not be used in the warmer climate zones as indicated to avoid a reversed vapor retarder and creation of a condensation plane. Where appropriate, language also is added to differentiate from membrane-type vapor retarders and other materials or practices, such as use of foam plastics which can control vapor condensation as a vapor retarder material and insulation material to prevent dew-point temperatures from occurring within an envelope assembly. Finally, the term "insulated sheathing" is replaced with "continuous insulation" to provide a more generic requirement that is inclusive of a variety of materials that can be used for this purpose.

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

R702.7-RB-CRANDELL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this is an important issue but the proposal is needlessly complex. The proponent should rework with the modification submitted and bring back.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council, and Michael D. Fischer, Kellen Company, representing Kellen Codes, Standards and Regulatory Advocacy, request Approval as Modified by this Public Comment.

Replace the proposal as follows:

R702.7 Vapor retarders. Vapor retarders complying with Section R702.7.1 shall be provided in accordance with Table R702.7(1).~~Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.~~

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Assemblies designed and constructed in accordance with an approved hygrothermal analysis.

~~**R702.7.2 Class III vapor retarders.** Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met.~~

R702.7.~~3.~~1 Material vapor retarder class. The *vapor retarder class* of any material used as a vapor retarder shall be based on the manufacturer's certified testing or a tested assembly. The following vapor retarder membranes shall be deemed to meet the class specified:

Class I: Sheet polyethylene, nonperforated aluminum foil
Class II: Kraft-faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0.
Class III: Latex or enamel paint.

TABLE R702.7(1)
REQUIREMENTS FOR VAPOR RETARDER
ON INTERIOR FACE OF ASSEMBLIES

Climate Zone[a]	Class I	Class II	Class III
1-2	not permitted[b]		permitted
3-4	not permitted	permitted[c]	
4 Marine, 5-8	Required[c] -- Class I[d], Class II , or Class III[e]		

a. Climate Zone shall be selected in accordance with Table N1101.10
b. Kraft paper insulation facer or other Class II vapor retarders with equal or greater perm rating shall be permitted.
c. Use of exterior continuous insulation in Climate Zones 4-8 with a Class I or II interior vapor retarder shall be in accordance with the additional requirements of Table R702.7(2)
d. A Class I vapor retarder shall not be provided on the interior face of the assembly where a Class I vapor retarder material is installed on the exterior face of the assembly.
e. The use of Class III vapor retarders in Climate Zones 4 Marine and 5-8 shall be in accordance with Table R702.7(3).

TABLE R702.7(2)
EXTERIOR CONTINUOUS INSULATION
WITH CLASS I OR CLASS II INTERIOR VAPOR RETARDERS

CLIMATE ZONE	Maximum Heating Degree Days ($HDD65^{o}F$)	Minimum R_e/R_i Ratio[a]
1-3	n/a	n/a
4	5,400	0.2
5	7,200	0.2
6	9,000	0.2
7	12,600	0.35
8	15,000	0.45
8	20,000	0.6
8	>20,000	0.75

For SI: °C = [(°F)-32]/1.8.; 1 R = 0.176 RSI

a. R_e = exterior continuous insulation R-value; R_i = permeable cavity insulation R-value interior of continuous insulation. The minimum ratio of R_e/R_i shall be used to determine acceptable combinations of continuous insulation and cavity insulation. Interpolation for intermediate values of heating degree days shall be permitted.

b. Spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum shall be permitted to apply its R-value to the R_e value.

TABLE R702.7(3)~~.1~~
CLASS III INTERIOR VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a]
Marine 4	Vented cladding over wood structural panels.
	Vented cladding over fiberboard.
	Vented cladding over gypsum.
	Insulated sheathing with *R*-value ≥ 2.5 over 2 × 4 wall.
	Insulated sheathing with *R*-value ≥ 3.75 over 2 × 6 wall.
5	Vented cladding over wood structural panels.
	Vented cladding over fiberboard.
	Vented cladding over gypsum.
	Insulated sheathing with *R*-value ≥ 5 over 2 × 4 wall.
	Insulated sheathing with *R*-value ≥ 7.5 over 2 × 6 wall.
6	Vented cladding over fiberboard.
	Vented cladding over gypsum.
	Insulated sheathing with *R*-value ≥ 7.5 over 2 × 4 wall.
	Insulated sheathing with *R*-value ≥ 11.25 over 2 × 6 wall.
7 and 8	Insulated sheathing with *R*-value ≥ 10 over 2 × 4 wall.
	Insulated sheathing with *R*-value ≥ 15 over 2 × 6 wall.

(Portions of Table not shown remain unchanged)

Commenter's Reason:

(Crandell): The original RB358-13 proposal and a floor modification received positive technical feedback and discussion at the code development hearing and the committee recognized that "this is an important issue" (see reason statement with the original proposal). But, the committee also felt that the floor modification needed to be simplified and directed the proponent to "rework with the modification submitted and bring back" to the final action hearing. This public comment is submitted for that purpose.

The following is a brief explanation and summary of the key features of this proposal:

1. There are no technical changes included in this public comment on the original proposal and floor modification as presented at the first hearing (except to coordinate with committee action on RB357).
2. As requested by the committee, the original proposal and floor modification have been reworked to provide a simple means of determining vapor retarder requirements. For most construction, it's a one-step look-up process that begins and ends with Table R702.7(1).
3. If a Class III vapor barrier is used in Climate Zones 4 Marine and 5-8, a simple table is used to look-up requirements (same as existing table in the code, just renumbered to Table R702.7(3))
4. If continuous insulation is used, sizing of the insulation package (ratio of continuous insulation R-value vs. cavity R-value) is provided in Table R702.7(2) to ensure that the insides of such walls are warm enough in a given climate to control condensation potential (e.g., limit occurrence of dew-point temperature within the wall). These provisions are based on a review of scientific literature and successful practices included in the National Building Code (NBC) of Canada since 1995 (1)(2). This approach allows for many compliant solutions. Table R702.7(2) does not apply to walls without exterior continuous insulation.

In addition to the above, this proposal includes clear language to prohibit construction of walls that are dual vapor barrier assemblies which do not provide adequate drying potential of assemblies (refer to Table R702.7(1), footnote d). Furthermore, the proposed Table R702.7(1) makes it very clear where interior vapor retarders of the three classes are permitted, not permitted, or required such that occurrences of a "reversed" vapor retarder wall are avoided (e.g., table clearly prohibits use of a Class I vapor retarder in the inside of walls in hot/humid climates where this causes well-documented condensation and moisture-related problems).

Finally, it is important to note that this proposal introduces no new requirements that are not already intended, except for new Table R702.7(2) which addresses appropriate vapor retarder requirements only for walls with continuous insulation. For additional information on this public comment, including technical references and practical guidance, refer to the additional technical information to be provided at http://fsc.americanchemistry.com .

References on NBC provisions:

(1) Chown, G.A. and Mukhopadhyaya, P. (2005). "NBC 9.25.1.2: The on-going development of building code requirements to address low air and vapour permeance materials", NRCC-47656, 10th Canadian Conference on Building Science and the Integrated Design Process, May 12-13, 2005, National Research Council Canada

(2) Kumaran, M.K. and Haysom, J.C. (2000) "Low-Permeance Materials in Building Envelopes", Construction Technology Update No. 41, Institute for Research in Construction, National Research Council of Canada. Revised March 2002.

(Fischer): The proposed modification in this public comment includes a consideration for the use of spray foam to comply with the continuous insulation prescriptions contained in the proposed tables. This revision brings the comment into agreement with the IRC Building code committee action on RB357-13, and insures that the committee intent on that proposal is maintained in this additional change.

The building science concepts carried in this proposal will improve moisture management within wall assemblies, and thus improve building performance, durability, and effective energy efficiency. It provides clear direction on the use of vapor barriers in high performance walls, and helps to ensure that vapor barrier systems are properly designed, selected, and installed.

RB358-13

Final Action: AS AM AMPC____ D

RB362-13
R703.2, Chapter 44

Proposed Change as Submitted

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.2 Water-resistive barrier. One layer of ~~No.15 asphalt felt~~ water-resistive barrier, free from holes and breaks, complying with ASTM E 2556, such as ASTM D 226 ~~for~~ Type 1 felt, or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. ~~Such felt or material~~ The water-resistive barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, ~~felt~~ the water-resistive barrier shall be lapped not less than 6 inches (152 mm). The ~~felt or other approved material~~ water-resistive barrier shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

Add new standard to Chapter 44 as follows:

ASTM

E2556-10 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: The proposal updates the water-resistive barrier reference to the most consensus standard. ASTM E2556 includes house wrap materials, and building papers in addition to traditional felt, and therefore is more representative of the state of the industry. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers and therefore should not limit the use of current WRB's. The materials included in ASTM E2556 – felt, Grad D paper, and building wraps – are all installed in the manner currently prescribed in this section of the code.

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

Analysis: A review of the standard proposed for inclusion in the code, ASTM E 2556 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R703.2 #2-RB-WESTON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM E2556-10 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Disapproved

Committee Reason: The committee feels the language contains commentary. The reference standard is not appropriate for the application and the complete system should be tested in lieu of the components.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Theresa A. Weston, PhD., Dupont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.2 Water-resistive barrier. One layer water-resistive barrier, free from holes and breaks, complying with ASTM E 2556, ~~such as ASTM D 226 Type 1 felt~~, or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. The water-resistive barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, the water-resistive barrier shall be lapped not less than 6 inches (152 mm). The water-resistive barrier shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

Commenter's Reason: The original proposal updates the water-resistive barrier reference to include consensus standard for water-resistive barrier materials. ASTM E2556 includes house wrap materials, and building papers in addition to traditional felt, and therefore updates the code to include practices that are have been used for the last two decades and, are in fact, used by the majority of the industry. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers and therefore should not limit or change the use of current WRB's. The materials included in ASTM E2556 – felt, Grade D paper, and building wraps – are all installed in the manner currently prescribed in this section of the code, "applied horizontally, with the upper layer lapped over the lower layer" and therefore, the inclusion of a material only standard is appropriate. The modification does address the committee's comments on commentary and deletes the commentary the committee identified.

RB362-13

Final Action: AS AM AMPC____ D

RB364-13
R703.2, Chapter 44

Proposed Change as Submitted

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.

Add new standard to Chapter 44 as follows:

AAMA

AAMA 504-05 Voluntary Laboratory Test Method to Qualify Fenestration Installation Procedures

Reason: This proposal provides a testing alternative to the prescriptive water-resistive barrier material and installation provided in R703.2. This will allow for innovation while still ensuring the performance and durability of the WRB system. AAMA 504 is an industry standard that includes the water resistance testing of assemblies including "*certain physical loading and temperature cycling conditions to simulate service conditions*". The inclusion of physical loading and temperature cycling as a durability assessment is important to water-resistive barrier systems as they have low accessibility after construction and are critical to moisture performance of the wall system.

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

Analysis: A review of the standard proposed for inclusion in the code, AAMA 504 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R703.2 #1-RB-WESTON.docc

Committee Action Hearing Results

For staff analysis of the content of AAMA 504-05 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee feels that the standard only tests a component and not the assembly.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Theresa A. Weston, PhD., Dupont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls in accordance with Section R703.2.1. ~~Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.~~

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. ~~In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.~~

R703.2.1 Application. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1. Fenestration openings shall be flashed in accordance with R703.8 or tested in accordance with, and meet the requirements of, AAMA 504.

Commenter's Reason: The original proposal provides a testing alternative to the prescriptive water-resistive barrier material and installation provided in R703.2. AAMA 504 is an industry standard that includes the water resistance testing of assemblies including "*certain physical loading and temperature cycling conditions to simulate service conditions*". The inclusion of physical loading and temperature cycling as a durability assessment is important to water-resistive barrier and integrated flashing systems as they have low accessibility after construction and are critical to moisture performance of the wall system.

The modified proposal answers the committee's concerns on the applicability of the test standard in two ways. First, it separates the application of water-resistive barriers from the water-resistive barrier material requirements. The proposed test method reference addresses the interface of materials. The performance and durability of alternate water-resistive barrier materials must be separately addressed in addition to testing installation methods. Second, the modification limits the use of the test method to be more consistent with the scope of the reference standard.

Public Comment 2:

Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1. Fenestration openings shall be flashed in accordance with R703.8 or tested in accordance with, and meet the requirements of, AAMA 504.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. ~~In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.~~

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The original proposal provided an exception to the requirement for a water resistive barrier in wall assemblies that have been tested in accordance with AAMA 504 and met its requirements. The committee disapproved the proposal as submitted because they felt the standard only tested a component of a wall assembly and not the entire assembly and therefore was not appropriate as an exception to a requirement for the entire assembly.

In actuality AAMA 504 is intended as a test method for verifying the continuity of the water resistive barrier from the exterior wall assembly through to fenestration placed in that assembly. So the committee was correct in their understanding that AAMA 504 was not intended to test a wall assembly. it does, however, test more than a single component. It tests the assembly of components that are used to create an interface between the exterior wall assembly and fenestration placed within that wall.

The integrity of the water resistive barrier through the interface between the exterior wall and fenestration is an important aspect of proper window and door installation. AAMA's members have spent many years studying the properties of water, water penetration, water resistance, and how to properly install a window into an exterior wall while preventing water penetration into the wall from the exterior.

Section R703.2 addresses the water resistive barrier in an exterior wall, and penetration and appendages to that wall. Specifically, penetrations through the exterior wall are required to comply with Section R703.1.

The continuity of the water resistive barrier around and through fenestration openings, however, is not addressed in Section R703.1. This Public Comment modifies the original proposal to specifically address fenestration openings in the exterior wall assembly. It specifies that fenestration openings are to be flashed in accordance with Section R703.8, or they shall be tested in accordance with, and meet the requirements of, AAMA 504. Both methods are appropriate means of providing continuity of the water resistive barrier through and around fenestration openings.

RB364-13

Final Action: AS AM AMPC____ D

RB365-13
R703.1.1, R703.2, R703.2.1 (NEW), R703.2.2 (NEW), R703.8

Proposed Change as Submitted

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee and American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly.
Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed according to Section R703.7 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.8, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
    2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
    2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
    2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
    2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours.

    The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.

3. <u>Water resistive barrier materials and methods used as an alternative to Section R703.2.1 or R703.2.2 shall comply with the following:</u>

    1. <u>The testing required by Exception 2 of Section R703.1.1 applies except:</u>

        <u>1.1. Cladding is not required.</u>
        <u>1.2. The minimum pressure differential shall be 2.86 pounds per square foot (137Pa).</u>
        <u>1.3. The minimum test exposure time shall be 15 minutes.</u>

1.4. <u>The performance need not exceed the performance of the water resistive barrier installation specified in Section R703.2.1 or R703.2.2 as tested under identical minimum pressure and exposure time conditions.</u>

2. <u>The alternative water resistive barrier shall be installed in accordance with the manufacturer's installation instructions.</u>

R703.2 Water-resistive barrier. <u>Water-resistive barriers shall comply with Section R703.2.1 or R703.2.2, or shall be approved in accordance with Section R703.1.1, exception #3.</u>

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

<u>**R703.2.1 No. 15 asphalt felt.**</u> One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt ~~or other approved water-resistive barrier~~ shall be applied over studs or sheathing of all exterior walls. Such felt ~~or material~~ shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt ~~or other approved material~~ shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

<u>**R703.2.2 Grade D paper.** Grade D paper behind exterior plaster and lath shall installed in accordance with Section R703.6.3.</u>

R703.8 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish <u>or a water-resistive barrier complying with Section R703.2</u>. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
   - 1.2. In accordance with the flashing design or method of a registered design professional.
   - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.

7. At built-in gutters.

Reason:

This proposal reorganizes Section R703.2 and coordinates with water-resistance requirements of Section R703.1.1 to more completely and clearly address the types of water-resistive barriers currently included in the IRC and define requirements for alternatives. It also coordinates proper integration of flashing with the water-resistive barrier layer in Section R703.8.

Most importantly, this proposal addresses a critical gap in the code by establishing a uniform water penetration performance requirement for all types of “other approved” (alternative) water resistive barriers. The proposed water resistance requirements rely on the same test method already include in Section R703.1.1 and modifies the criteria to be appropriate for testing the WRB layer alone (not including cladding) such that alternative WRB’s can be used with any cladding material without having to test a full assembly for each type of cladding or apply criteria in Section R703.1.1 that are meant to be applied with cladding present. The proposed water resistance test criteria (2.86 psf and 15 minute duration) are identical to requirements for water penetration testing of water-resistive barrier coatings in accordance with ASTM E2570 and are appropriately more restrictive than the water-resistance criteria applied to water-resistive air-barrier materials per ASTM E1677.

This change is necessary because some alternative water-resistive barrier materials, such as polymer-based barriers (i.e., “building wraps”) are approved for use only requiring a material property to be tested and standards for this type of material, such as ASTM E2556, do not address actual installed performance of the water-resistive barrier including penetrations, fastenings, joint detailing and other factors representative of end-use conditions. In fact, ASTM E 2556 states in its scope that “this specification is limited to the evaluation of materials and does not address installed performance.” Installed performance is surely the most important consideration and it is neglected in current standards for some materials.

The main reason for this proposal is that WRB performance is largely governed by how it performs as an installed assembly under in-service moisture exposure conditions. This concern is addressed for some types of WRB materials and installations (e.g., WRB panels, WRB coatings, etc.), but not for others (e.g, polymer-based barriers or wraps).

The significance of this concern over the lack of a uniform water-penetration resistance requirement is documented in the literature (Hall, G.D. and Hoigard, K.R., “Water-Resistive Barriers: How do they compare?”, *Interface*, November 205). In particular, this reference evaluated current code requirements, acceptance criteria, and field experience. It also reports comparative test data under installed water exposure conditions. The primary conclusions from the study include:

“Current building code provisions offer no rational means of assessing the equivalency of alternative WRB products to ASTM D-266 type 1 asphalt-saturated felt…”

“The three water resistance test methods specified in AC38 vary so significantly in test duration and applied hydrostatic pressure that no meaningful comparison of test data can be made. They fail to address several important moisture transport mechanisms that affect the in-service performance of WRBs.”

“Laboratory tests performed by the authors to simulate potential in-service conditions not addressed by AC38 resulted in water penetration through several commercially available WRB materials that, according to published manufacturer information, passed the requirements of AC38 for Grade D barriers.”

Clearly, these issues must be addressed in the IRC to ensure acceptable and consistent performance of various types of WRB materials and assemblies. Your approval of this proposal will establish a sound foundation for evaluation of alternative WRB materials and installations to avoid inconsistent requirements resulting in poor or inconsistent performance among alternative WRB materials.

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

R703.1.1-RB-CRANDELL.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels the tests methods should be in a standard and not in the code text.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, AREA Consulting, representing Foam Sheathing Committee of the American Chemistry Council, request Approval as Submitted.

Commenter's Reason: This proposal provides testing requirements for testing of WRB materials as an assembly based on testing criteria that are already included in the code text for wall assemblies with cladding applied (but which are not appropriately and consistently applied to WRB materials and assemblies when tested without cladding applied for qualification purposes). Thus, the code already establishes a precedent for dealing with such matters in the code when existing standards are silent or inconsistent. Thus, the code development committee's reason that performance test should not be included in the code are inconsistent with current and past practice, especially when the code is supposed to provide consistent direction and a uniform performance baseline in these matters. The need for this proposal, as a means of establishing appropriate and consistent minimum test criteria for water-resistance testing of WRB assemblies, is thoroughly presented and supported by the technical literature in the original proposal submission as published in the agenda for the code development committee hearing. Please refer to the original proposal's reasons statement for technical justification. Your support of this PC at the final action hearing will ensure that enforcement of approved WRB materials and assemblies will result in consistent minimum performance across all WRB material types.

RB365-13

Final Action: AS AM AMPC____ D

RB367-13
R703.4, Table R703.5 (NEW)

Proposed Change as Submitted

Proponent: Andrew Herseth, US Dept of Homeland Security, Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. The use of Table R703.4 shall be limited according to the building mean roof height, ultimate design wind speed in accordance with Figure R301.2(4)A, and exposure category in accordance with Section R301.2.1.4 as shown in Table R703.5. Where ~~the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher~~ the limits of Table R703.5 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4

Maximum Mean Roof Height			
Basic Wind Speed (mph-3-second gust)	**Exposure**		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR

NL = not limited by Table R703.5, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

Reason: The proposal is intended to better establish the current limits of the prescriptive fastening table for wall coverings. The prescriptive fastening requirements in Table R703.4 are limited to a maximum design pressure of 30 psf. According to Table R301.2(2), for Zone 5 and an effective wind area of 10 ft^2, the maximum negative pressure for a basic wind speed of 110 mph is 29.1 psf. This value – less than 30 psf – correlates directly with the 110 mph limitation in Section R703.4. However, the tabulated pressures in Table R301.2(2) are for an assumed Exposure B site condition and a mean roof height of 30 feet. For residential buildings with a basic wind speed of 110 mph and Exposure C or D, or a mean roof height greater than 30 feet, the maximum negative pressure would be substantially higher than 30 psf. For example, consider the case of a residential building located in Exposure C, with a mean roof height of 45 ft. The adjustment factor from Table R301.2(3) would be 1.53. The resulting maximum negative design pressure for a basic wind speed of 110 mph would be (29.1 psf) x 1.53 = 44.5 psf. This wall cladding load far exceeds the current implied limitation of Table R703.4 which is 30 psf.

Table R703.5 has been added to simplify the determination of whether prescriptive fastening provisions of Table R703.4 apply to a specific building. The limits in the table indicate where component and cladding pressures exceed 30 psf as a function of wind speed exposure and mean roof height. In most cases, especially in areas with lower wind speeds, the prescriptive fastening requirements in Table R703.4 will be verified as applicable. Chapter 7 of ICC 600 includes prescriptive attachment schedules for exterior wall coverings that may be applied when mean roof height limits per Table R703.5 are exceeded.

FEMA P-499, *Home Builder's Guide to Coastal Construction* (FEMA, 2009), includes Technical Fact Sheet 5.3 which addresses the attachment of siding in areas where wind loads for wall cladding exceed 30 psf as a result of wind speed, and/or exposure category and/or roof mean height by recommending the selection of a siding product rated for those conditions or higher. The manufacturer's product literature or installation instructions should specify the fastener type, size and spacing, and any other installation details such as requirements for the sheathing materials behind vinyl siding that is needed to achieve the product rating.

New language is also added to require design wind pressures to be determined using an effective wind are of 10 ft^2. For wall cladding, the effective wind area will be governed by the effective wind area of an individual fastener which will almost always be less than 10 ft^2.Guidance for Determining Site-Specific Loads in Chapter 8 of FEMA P-55, *Coastal Construction Manual* (FEMA, 2011), recommends that "for cladding and fasteners, the effective wind area should not be greater than the area that is tributary to an individual fastener. In ASCE 7-10, there is no adjustment for wind areas less than 10 ft2; therefore, sheathing suction loads (should be) based on an effective wind area of 10 ft2 for different zones on the roof."

Changing the trigger for using Table R703.4 from a wind speed limit to a pressure limit will result in better correlation of the actual limits of the table. The new attachment criteria would also make IRC consistent w/ ICC 600 and the Florida Building Code (FBC) where attachment provisions for exterior wall coverings are pressure-triggered.

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

R703.4-RB-HERSETH-OVERCASH.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. ~~The use of Table R703.4 shall be limited according to the building mean roof height, ultimate design wind speed in accordance with Figure R301.2(4)A, and exposure category in accordance with Section R301.2.1.4 as shown in Table R703.5.~~ Where the design wind pressure exceeds 30 psf or where the limits of Table R703.5 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4

Maximum Mean Roof Height			
~~Basic~~ Ultimate Wind Speed (mph-3-second gust)	**Exposure**		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR
140	35'	DR	DR

NL = not limited by Table R703.5, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

Committee Reason: The change provides for a method to determine that the limits of fastening in Table R703.4 are not exceeded. The modification clarifies the new language and corrects the table.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jay H. Crandell, ARES Consulting, representing Foam Sheathing Committee of the American Council and the Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4(1) or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. Unless specified otherwise in accordance with this code, furring attachments to wall framing shall comply with Table R703.4(2). Where the design wind pressure exceeds 30 psf or where the limits of Table R703.5 are exceeded, the attachment of wall coverings and furring shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.4 (1)
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

(Portions of Table not shown remain unchanged)

TABLE R703.4(2)
MINIMUM FURRING AND ATTACHMENT REQUIREMENTS
TO RESIST MAXIMUM 30 PSF DESIGN WIND LOAD[1,2,3]

Connection Method	16" Furring Spacing		24" Furring Spacing	
	1x3 Wood Furring	1x4 Wood Furring	1x3 or 1x4 Wood Furring	2x3 Wood Furring
8d common nail (2-1/2"x0.131"), minimum 1-1/4 penetration	1 at 12"oc or 2 at 16"oc	2 at 24"oc	2 at 16"oc	2 at 16"oc
#10 Wood Screw (minimum 1" penetration)	1 at 16"oc	1 at 24"oc	1 at 16"oc	1 at 24"oc
#8 screw[4] to minimum 33mil or thicker steel stud (minimum penetration of steel thickness + 3 threads)	1 at 16"oc	2 at 24"oc	1 at 12"oc or 2 at 16"oc	1 at 12"oc or 2 at 24"oc

For SI: 1 inch = 25.4mm

1. Wood furring and wall framing shall be Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS. Wood structural panel wall sheathing of equal or greater effective specific gravity for withdrawal shall be permitted to be included in the penetration depth. The span of 1x4 furring across studs or between fastening points shall not exceed 24" inches for a maximum 16"oc furring spacing. In all other cases, 1x3 or 1x4 wood furring shall not exceed a 16" span across studs or between fastening points.
2. Where the required cladding fastener penetration into wood material exceeds ¾ inch (19.1 mm) and is not more than 1-1/2 inches (38.1 mm), a minimum 2x3 wood furring shall be used or an approved design. Minimum fastener penetration into wall framing shall not be reduced with use of thicker furring member.
3. Cold formed steel framing (studs, tracks, and hat channels) shall be minimum 33 ksi and minimum 33 mil thickness. A minimum 7/8-inch (22.2mm) deep steel hat channel shall be permitted to be substituted for 1x3 or 1x4 wood furring and shall use the respective fastening schedule. A minimum 1.5-inch (38.1mm) deep steel hat channel shall be permitted to be substituted for a 2x furring. Hat channels shall have a minimum 1-1/4 inch (31.8mm) top width, minimum ½-inch (12.7mm) side flanges, and a minimum total width of 2-1/2 inches (63.5mm).
4. Screws into cold formed steel framing shall comply with ASTM C1513. The minimum screw head size shall be 0.285 inches (7.2mm)

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4(1) AND TABLE R703.4(2)

(Portions of Table not shown remain unchanged)

Commenter's Reason: RB367-13 was approved as modified to provide clear limits t prescriptive wall covering attachments for wind load resistance. The intent of this public comment is to further improve the goal of RB367-13 and to coordinate with the committee's action to approve as modified RB389-13 and RB390-13. This proposal is also consistent with the committee's approval of RB392-13 as modified with provisions for cladding connection to steel framing.

Furring attachments are often a part of a wall covering assembly and compatible attachment limits are needed to ensure a complete wind load path from the wall covering, through the furring, and to the framing. The topic of wind pressure resistance of furring attachments was included in proposals RB389-13 and RB390-13 for wood and cold-formed steel framing, but was removed by the proponent's modification approved by the code development committee. The code development committee recognized that wind pressure requirements for furring would be "better handled by other sections of the code" that are broader in scope of application. The appropriate section of code to address this issue is Section R703.4. Thus, it is appropriate to further modify RB367-13 which is directly related to the wind pressure concern for attachment of wall coverings (and furring is used as part of a wall covering assembly). Such information is currently missing from the code and can create a "weak link" for the wind load path through wall covering assemblies to framing.

The furring and attachments in proposed new Table R703.4(2) comply with the maximum 30 psf wind load limit for the IRC which is consistent with the limitations given in Table R703.5 added by RB367-13. The prescribed furring attachment in the proposed new Table R703.4(2) are limited by the lesser of:

1. allowable fastener withdrawal (based on the NDS and AISI S-100)
2. allowable bending strength of furring (based on NDS and AISI S-100)
3. fastener head pull-through (based on test data and literature-topic not addressed in design standard)

RB367-13

Final Action: AS AM AMPC____ D

RB369-13

R703.5.1, R703.5.3, Table R703.5.1(2) (New), Table R703.5.1(3) (NEW), Table R703.5.2, R703.5.3.1, R905.7.5, Table R905.7.5(2) (NEW), R905.8.6

Proposed Change as Submitted

Proponent: David Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau

Revise as follows:

R703.5.1 Application. Wood shakes or shingles shall be applied either single-course or double-course over nominal $^{1}/_{2}$-inch (13 mm) wood-based sheathing or to furring strips over $^{1}/_{2}$-inch (13 mm) nominal nonwood sheathing . A permeable water-resistive barrier shall be provided over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51 mm) and vertical overlaps of not less than 6 inches (152 mm). Where furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25 mm by 76 mm or 25 mm by 102 mm) and shall be fastened horizontally to the studs with 7d or 8d box nails and shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.5.2. The spacing between adjacent shingles to allow for expansion shall ~~not exceed $^{1}/_{4}$ inch (6 mm)~~ be 1/8 inch (3 mm) to ¼ inch (6 mm) apart and between adjacent shakes, ~~it~~ shall ~~not exceed $^{1}/_{2}$ inch (13 mm)~~ be 3/8 inch (10 mm) to ½ inch (13 mm) apart. The offset spacing between joints in adjacent courses shall be a minimum of $1^{1}/_{2}$ inches (38 mm).

TABLE R703.5.1(2)
SINGLE COURSE SIDEWALL FASTENERS

Product Type	Nail Type & Minimum Length
R & R and Sanded Shingles	**Type (in)**
16” and 18” shingles	3d Box 1 1/4
24” Shingles	4d Box 1 1/2
Grooved Shingles	**Type (in)**
16” and 18” shingles	3d Box 1 1/4
24” shingles	4d Box 1 ½
Split and Sawn Shakes	**Type (in)**
18” Straight-Split Shakes	5d Box 1 3/4
18” and 24” Handsplit Shakes	6d Box 2
24” Tapersplit Shakes	5d Box 1 3/4
18” and 24” Tapersawn Shakes	6d Box 2

TABLE R703.5.1(3)
DOUBLE COURSE SIDEWALL FASTENERS

Product Type	Nail Type & Minimum Length
R & R and Sanded Shingles	**Type (in)**
16” and 18” and 24” shingles	5d Box 1 ¾ or same size casing nails
Grooved Shingles	**Type (in)**
16” and 18” and 24”shingles	5d Box 1 3/4
Split and Sawn Shakes	**Type (in)**
18” Straight-Split Shakes	7d Box 2 ¼ or 8d 2 1/2
18” and 24” Handsplit Shakes	7d Box 2 ¼ or 8d 2 1/2
24” Tapersplit Shakes	7d Box 2 ¼ or 8d 2 1/2
18” and 24” Tapersawn Shakes	7d Box 2 ¼ or 8d 2 1/2

TABLE R703.5.2

MAXIMUM WEATHER EXPOSURE FOR WOOD SHAKES AND SHINGLES ON EXTERIOR WALLS[a,b,c]
(Dimensions are in inches)

LENGTH	EXPOSURE FOR SINGLE COURSE	EXPOSURE FOR DOUBLE COURSE
Shingles[a]		
16	~~7 ½~~ 7	12[b]
18	~~8 ½~~ 8	14[c]
24	~~11 ½~~ 10 ½	16[d]
Shakes[a]		
18	~~8 ½~~ 8	14
24	~~11 ½~~ 10 ½	18

For SI: 1 inch = 25.4 mm.

a. Dimensions given are for No. 1 grade.
b. A maximum ~~10-inch~~ 9-inch exposure is permitted for No. 2 grade.
c. A maximum ~~11-inch~~ 10inch exposure is permitted for No. 2 grade.
d. A maximum 14-inch exposure is permitted for No. 2 grade.

~~**R703.5.3 Attachment.** Each shake or shingle shall be held in place by two hot-dipped zinc-coated, stainless steel, or aluminum nails or staples. The fasteners shall be long enough to penetrate the sheathing or furring strips by a minimum of $^{1}/_{2}$ inch (13 mm) and shall not be overdriven.~~

703.5.3 Attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Each shake or shingle shall be held in place by two~~.~~ stainless steel Type 304 , Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) corrosion resistant box nails in accordance with Table R703.5.1(2) or R703.5.1 (3). Alternatively, 16 gauge stainless steel Type 304 or Type 316 staples with crown widths 7/16 inch (11 mm) minimum, ¾ inch (19 mm) maximum shall be used and the crown of the staple shall be placed parallel with the butt of the shake or the shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25 mm) above the butt line of the succeeding course and ¾" (19 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two fasteners, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19 mm) from each edge. Fasteners installed within 15 miles 24 km) of salt water coastal areas shall be stainless steel Type 316. Fasteners for fire-retardant-treated in accordance with Section R902 or pressure-impregnated-preservative-treated shakes or shingles in accordance with AWPA U1 shall be, stainless steel Type 316. The fasteners shall be long enough to penetrate and shall penetrate the sheathing or furring strips by a minimum of ½ inch (13mm) and shall not be overdriven. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

~~**R703.5.3.1 Staple attachment.** Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Staples for untreated (natural) wood shakes or wood shingles shall be 16 gauge Stainless Steel Type 304,Type 316 (Fasteners installed within 15 miles of salt water coastal areas shall be stainless steel Type 316.) Staples shall not be less than 16 gauge and shall have a crown width of not less than minimum 7/16 inch (11mm), maximum of ¾" and the crown of the staples shall be parallel with the butt of the shake or shingle.~~
~~In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25mm) above the butt line of the succeeding course and ¾" (19mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two casing nails~~ staples~~, driven approximately 2 inches (51mm) above the butt line and 3/4" inch (19mm) from each edge. In all application, staples shall be concealed by the course above. With shingles wider than 810 inches (203254mm) two additional nails~~ staples ~~shall be required and shall be nailed driven approximately 1 inch (25mm) apart near the center of the shingle. Fasteners for fire-retardant-treated (as defined in section R902.2) shingles, shakes or pressure-impregnated-preservative-treated shingles or shakes in accordance with AWPA U1 shall be Stainless Steel Type 316, applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~

Revise as follows:

R905.7.5 Application. Wood shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shingles shall be laid with a side lap not less than 1 ½" (38mm) between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing between shingles shall not be less than ¼" to 3/8" (6mm to 10mm). Weather exposures for wood shingles shall not exceed those set in Table R905.7.5. Fasteners for untreated (naturally durable) wood shingles shall be ~~corrosion resistant with a minimum penetration of ½ inch (13mm) into the sheathing~~. ~~For sheathing less than ½ inch (13mm) in thickness, the fasteners shall extend through the sheathing.~~ stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) box nails in accordance with table R905.7.5 (2). Alternatively, 16 gauge stainless steel Type 304, or Type 316 staples with crown widths 7/16" (11mm) minimum, ¾" (19 mm) maximum shall be used. Fasteners installed within 15 miles (24km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾ inch (19 mm). For roof sheathing less than ~~½"~~ ¾" in (19 mm) thickness, each fastener shall ~~extend~~ penetrate through the sheathing. Wood shingles shall be attached to the roof with two fasteners per shingle positioned ~~no more than ¾" from each edge and no more than 1 inch (25mm) above the exposure line.~~ in accordance with the manufacturers installation instructions. Fasteners for fire-retardant-treated shingles in accordance with Section R902 or pressure-impregnated-preservative-treated shingles of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

TABLE R905.7.5 (2)
NAIL REQUIREMENTS FOR WOOD SHAKES AND WOOD SHINGLES

Shakes	**ASTM F 1667 Nail Type and Minimum Length**
18" Straight-Split	5d Box 1 ¾"
18" and 24" Handsplit and Resawn	6d Box 2
24" Tapersplit	5d Box 1 ¾"
18" and 24" Tapersawn	6d Box 2
Shingles	**ASTM F 1667 Nail Type and Minimum Length**
16" and 18"	3d Box 1 ¼"
24"	4d Box 1 ½"

R905.8.6 Application. Wood shakes shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes shall be laid with a side lap not less than 1 ½" (38mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 3/8 inch to 5/8 inch (9.5mm to 15.9mm) for shakes ~~and~~ including tapersawn shakes ~~of naturally durable wood shall be 3/8 inch to 5/8 inch (9.5 mm to 15.9 mm) for preservative-treated taper sawn shakes.~~ Weather exposures for wood shakes shall not exceed those set in Table R905.8.6. Fasteners for untreated (naturally durable) wood shakes shall be ~~corrosion resistant with a minimum penetration of ½ inch (12.7mm) into the sheathing~~. ~~For sheathing less than ½ inch (13mm) thick, the fasteners shall extend through the sheathing.~~ stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) corrosion resistant box nails in accordance with Table R905.7.5.(2). Alternatively, 16 gauge Type 304 or Type 316 stainless steel staples, with crowns width 7/16" minimum, ¾" maximum shall be used. Fasteners installed within 15 miles (24 km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾" inch (19 mm). Where the roof is less than ¾" (19 mm) thick, each fastener shall penetrate through the sheathing. Wood shakes shall be attached to the roof with two fasteners per shake positioned ~~no more than 1 inch (25mm) no more than 2inches (25 mm) above the exposure line.~~ in accordance with the manufacturer's installation instructions Fasteners for fire-retardant-treated (as defined in section R902) shakes or pressure-impregnated-preservative-treated shakes of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

Reason: There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners and rather than waiting for these incidents to include wall applications it is a proactive measure to increase the specifics of the fasteners used.

Specifying “corrosion resistant” is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product types. Increased specifics will improve wall system integrity and lifespan.

Shakes and shingles shall not be applied with the vertical edges tight together as doing this does not leave room for expansion. Defining the spacing requirements further will eliminate this incorrect application method which causes fish-mouthing, cupping and curling.

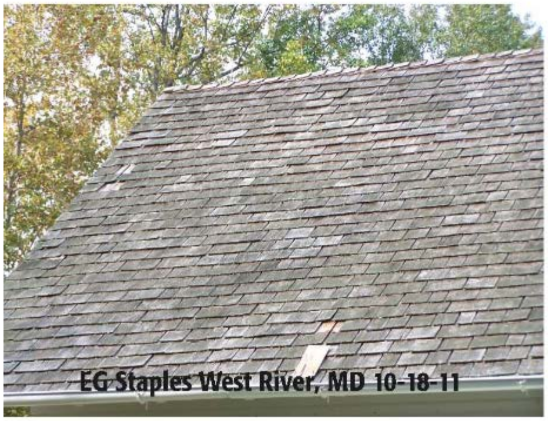
There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners. Specifying “corrosion resistant” is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product type. Increased specifics will improve roof system integrity and lifespan.

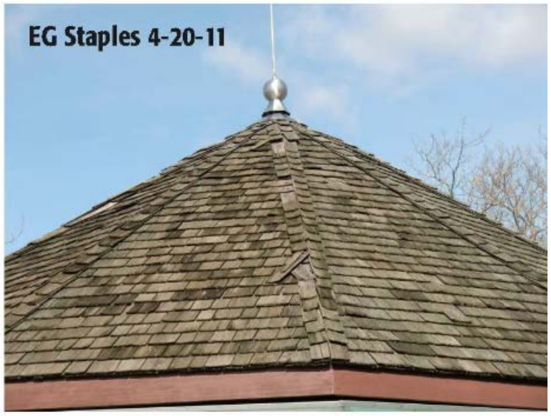
Penetration into sheathing more than ½” thick must be at minimum ¾” or all the way through the sheathing in order to attach the product strongly enough to hold in place and prevent loosening of the fastener.

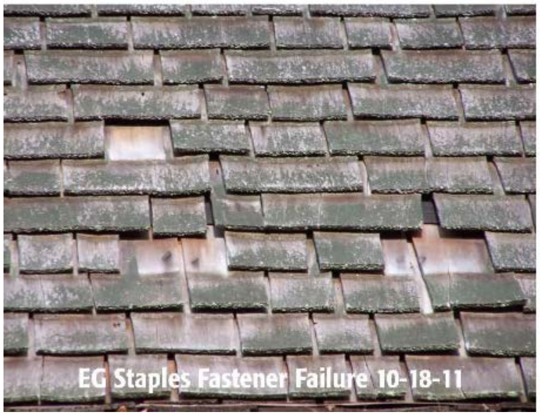
This change simplifies the code.

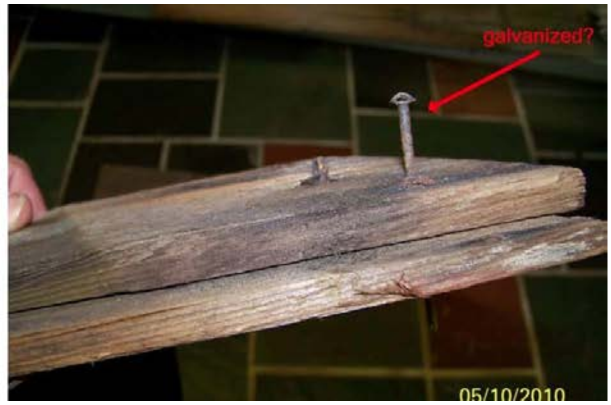
Following are examples of the failures that this code change is designed to prevent:

Shingles falling off buildings because of corroded fasteners or fasteners that did not adequately penetrate the substrate.









Cost Impact: The increased cost of these changes in comparison to the cost of the entire wall application is negligible.

R703.5.1-RB-ROODVOETS.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal provides little or no substantiation. There is no substantiation for the cost impact that was provided. This should be reworked with the modification that was ruled out of order and brought back.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.5.1 Application. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes or shingles shall be applied either single-course or double course over nominal ½ -inch (13mm) wood-based sheathing, or to furring strips over 1/2-inch (13mm) nominal non-wood sheathing. A ~~permeable~~ water-resistive barrier shall be provided over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51mm) and vertical overlaps of not less than 6 inches (152mm). Where horizontal furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25mm by 76mm or 25mm by 102 mm) and shall be fastened ~~horizontally~~ to the studs with minimum 7d box nails spaced a distance on center equal to the actual weather exposure of the shake or shingle, not to exceed the maximum exposure specified in Table R703.5.2. When installing shakes or shingles over a non-permeable water resistive barrier, furring strips shall be placed first vertically over the barrier and, in addition horizontal furring strips shall be fastened to the vertical furring strips prior to attaching the shakes or shingles to the horizontal furring strips. The spacing between adjacent shingles to allow for expansion shall be 1/8" (3) mm to ¼" (6mm) apart ~~and~~ between adjacent shakes shall be 3/8" (10 mm) to ½" (13mm) apart. The offset spacing between joints in adjacent courses shall be a minimum 1½inches (38mm).

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In response to testimony at the committee hearing the requirement for a permeable water-resistive barrier (WRB) is deleted. If a non-permeable water-resistive barrier is installed, continued durability and functionality requires that the shakes or shingles be spaced away from the WRB with furring strips. Literature and experience show that wood based exterior sidings perform best when there is a vertical channel behind the siding, but since the shakes and shingles must be nailed on horizontal furring there is a need for vertical furring to create the vertical air channel and the horizontal furring to create a nailing support. This is supported in "Reroofing and Residing to Save Energy", Building and Construction Technology Program, Department of Environmental Conservation, University of Massachusetts at Amherst.
Historically Cedar Sakes & Shingles have performed well when vapor permeable WRB's are used over wood. This is supported by the APA publication "Build Energy Efficient Walls" Form J440 The Engineered Wood Association.

The change requiring adding vertical and horizontal furring over WRB's will add cost to the construction, however it will also make the use of continuous insulation and non-permeable WRB's practical and durable. In fact the entire wall is expected to have superior moisture performance.
Other changes have eliminated redundant references not required in this section. Wording changes to clarify that 7d box nails are minimal and larger nails can be used where required for increased strength.

- Table 703.5.2 is unchanged from the original public proposal, however there were questions about the effect of the proposed changes on the cost of construction. This proposed code change reduces the exposure length of the shingles and shakes. The change is required as the longer exposure lengths allowed in the code are no longer considered practical. Exposure lengths have been decreased in accordance with manufacturers installation requirements that have been in installation manuals since 2002, and in practice in most areas long before that. Although the changes in size as proposed in this code change will theoretically increase costs, no practical change in cost is implicated as products installed according to manufacturers' requirements complied with this table. This change will increase the cost of construction over the costs if the current minimum code requirements are followed.

Public Comment 2:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R703.5.1(2)
Nail Requirements for Wood Shakes and Wood Shingles

Single Course Sidewall Fasteners			
Product Type	**Nail Type & Minimum length**	**Minimum Head Diameter**	**Minimum Shank Thickness**
R & R and Sanded Shingles			
16" and 18" shingles	3d box - 1 ¼"	0.19"	0.08"
24" Shingles	4d box - 1 ½"	0.19"	0.08"
Grooved Shingles			
16" and 18" shingles	3d box - 1 ¼"	0.19"	0.08"
24" shingles	4d box - 1 ½"	0.19"	0.08
Split and Sawn Shakes			
18" Straight-Split Shakes	5d box - 1 ¾"	0.19"	0.08"
18" and 24" Handsplit Shakes	6d box - 2"	0.19"	0.0915"
24" Tapersplit Shakes	5d Box-1 3/4	0.19"	0.08"
18" and 24" Tapersawn Shakes	6d Box- 2	0.19"	0.0915"

TableR703.5.1 (3)
Nail Requirements for Wood Shakes and Wood Shingles

Double Course Sidewall Fasteners			
Product Type	**Nail Type & Minimum length**	**Minimum Head Diameter**	**Minimum Shank Thickness**
R & R and Sanded Shingles			
16" and 18" and 24" shingles	5d box - 1 ¾" Or same size casing nail	0.19"	0.08"
Grooved Shingles			
16" and 18" and 24"shingles	5d box - 1 ¾"	0.19"	0.08"
Split and Sawn Shakes			
18" Straight-Split Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"
18" and 24" Handsplit Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"
24" Tapersplit Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"
18" and 24" Tapersawn Shakes	7d box - 2 ¼" or 8d box 2 ½"	0.19"	0.099"

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In accordance with comments made at the public hearing the Tables now prescribe minimum length, head diameter and thickness of the fasteners to be used.

Public Comment 3:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Table R 905.7.5 (2)
Nail Requirements for Wood Shakes and Wood Shingles

Shakes	**~~ASTM F1667~~ Nail Type and Minimum Length**	**Minimum Head Size**	**Minimum Shank Diameter**
18" Straight-Split	5d Box 1 ¾"	0.19'	.080"
18" and 24" Handsplit and Resawn	6d Box 2	0.19"	.0915"
24" Tapersplit	5d Box 1 ¾"	0.19"	.080"
18" and 24" Tapersawn	6d Box 2	0.19"	.0915"
Shingles	**~~ASTM F1667~~ Nail Type and Minimum Length**		
16" and 18"	3d Box 1 ¼"	0.19"	.080"
24"	4d Box 1 ½"	0.19"	.080"

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: In accordance with comments made at the public hearing the Tables now prescribe minimum length, head diameter and thickness of the fasteners to be used.

Public Comment 4:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.5.3 Attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Each shake or shingle shall be held in place by two~~.~~ ~~stainless steel Type 304 , Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft²)) corrosion resistant~~ box nails in accordance with Table R703.5.1(2) or R703.5.1 (3). Nails shall be stainless steel Type 304 or Type 316 or hot-dipped galvanized, with a coating weight of ASTM A 153 Class D (1.0 oz/ft²) Alternatively, two 16 gauge stainless steel Type 304 or Type 316 staples with crown widths 7/16 inch (11 mm) minimum, ¾ inch (19 mm) maximum shall be used and the crown of the staple shall be placed parallel with the butt of the shake or the shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25 mm) above the butt line of the succeeding course and ¾" (19 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two fasteners, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19 mm) from each edge. Fasteners installed within 15 miles 24 km) of salt water coastal areas shall be stainless steel Type 316. Fasteners for fire-retardant-treated in accordance with Section R902 or pressure-impregnated-preservative-treated shakes or shingles in accordance with AWPA U1 shall be, stainless steel Type 316. The fasteners shall be long enough to penetrate and shall penetrate the sheathing or furring strips by a minimum of ½ inch (13mm) and shall not be overdriven. ~~Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~ . Fastener packaging shall bear a label indicating the appropriate grade material or coating weight,

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The primary reason for this proposed code change is to better clarify the corrosion resistance of the fasteners.

Corroded wall fasteners have been noted in several areas, with the expectation that the corrosion will progress, resulting in shingles falling off walls. It is a proactive measure to increase the specifics of the fasteners used. Wall fastener corrosion similar to that of roofs fasteners has been noted where there are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners.

Specifying "corrosion resistant" is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product types. Increased specifics will improve wall system integrity and lifespan. The code currently requires more corrosion resistant fasteners in several applications as noted in **R402.1.1 Fasteners. (**Fasteners used below *grade*----shall be of Type 304 or 316 stainless steel.)

(From Randall Shackelford committee approved proposed code change RB176-13) "There has been a lot of work done on fasteners and connectors in contact with treated wood in the last 8-10 years. All the testing and historical performance of stainless steel were based on the traditional use of 300 series stainless steel. Yet there are many types of stainless steel, and some are much less corrosion resistant than others. By limiting the types of stainless steel to these specific series types, it ensures that the stainless steel fasteners will be corrosion resistant when exposed to treated wood."

Use of stainless steel or hot dipped galvanized fasteners will result in a very small increase the cost of construction over inferior fasteners previously allowed.

In response to testimony at the committee hearings the reference to ASTM F1667 was removed and replaced with specific minimum fastener length, diameter and head sizes in new table 703.5.1 in accordance with current industry practice. No added cost is expected from this better definition of the fasteners required.

Public Comment 5:

David L. Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau #2, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R905.7.5 Application. Wood shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shingles shall be laid with a side lap not less than 1 ½" (38mm) between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing between shingles shall not be less than ¼" to 3/8" (6mm to 10mm). Weather exposures for wood shingles shall not exceed those set in Table R905.7.5. Fasteners for untreated (naturally durable) wood shingles shall be ~~stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2))~~ box nails in accordance with table R905.7.5 (2). Nails shall be stainless steel Type 304 or Type 316 or hot-dipped galvanized, with a coating weight of ASTM A 153 Class D (1.0 oz/ft^2) Alternatively, two 16 gauge stainless steel Type 304, or Type 316 staples with crown widths 7/16" (11mm) minimum, ¾" (19 mm) maximum shall be used. Fasteners installed within 15 miles (24km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾ inch (19 mm). For roof sheathing less than ¾" in (19 mm) thickness, each fastener shall penetrate through the sheathing. Wood shingles shall be attached to the roof with two fasteners per shingle positioned in accordance with the manufacturers installation instructions. Fasteners for fire-retardant-treated shingles in accordance with Section R902 or pressure-impregnated-preservative-treated shingles of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. ~~Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~ . Fastener packaging shall bear a label indicating the appropriate grade material or coating weight,

R905.8.6 Application. Wood shakes shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes shall be laid with a side lap not less than 1 ½" (38mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 3/8 inch to 5/8 inch (9.5mm to 15.9mm) for shakes including tapersawn shakes Weather exposures for wood shakes shall not exceed those set in Table R905.8.6. Fasteners for untreated (naturally durable) wood shakes shall be ~~stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft^2)) corrosion resistant~~ box nails in accordance with Table R905.7.5.(2). Nails shall be stainless steel Type 304 or Type 316 or hot-dipped galvanized, with a coating weight of ASTM A 153 Class D (1.0 oz/ft^2) Alternatively, two 16 gauge Type 304 or Type 316 stainless steel staples, with crowns width 7/16" minimum, ¾" maximum shall be used. Fasteners installed within 15 miles (24 km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾" inch (19 mm). Where the roof is less than ¾" (19 mm) thick, each fastener shall penetrate through the sheathing. Wood shakes shall be attached to the roof with two fasteners per shake positioned in accordance with the manufacturer's installation instructions Fasteners for fire-retardant-treated (as defined in section R902) shakes or pressure-impregnated-preservative-treated shakes of naturally durable wood in accordance with AWPA U1 shall be stainless steel Type 316 and applied as above. ~~Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.~~ . Fastener packaging shall bear a label indicating the appropriate grade material or coating weight.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This modification is to clean up difficult language in the original proposal, and require labeling of the fasteners.

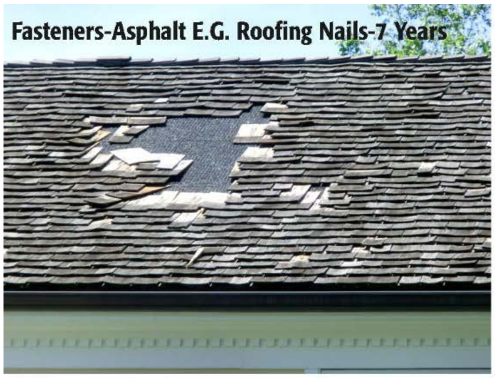
The primary reason for these code changes is the need to more clearly define the fasteners required.

There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners. Specifying "corrosion resistant" is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product type. Increased specifics will improve roof system integrity and lifespan. The code currently requires more corrosion resistant fasteners in several applications as noted in **R402.1.1 Fasteners. (**Fasteners used *below grade*----shall be of Type 304 or 316 stainless steel.

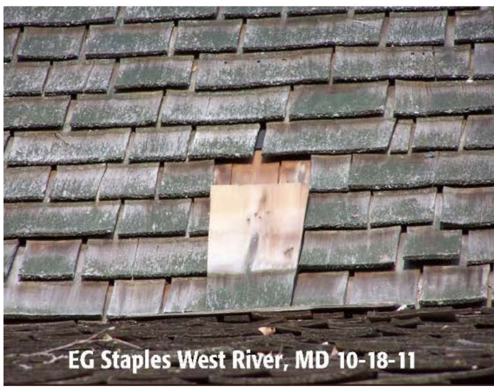
(From Randall Shackelford in committee approved proposed code change RB176-13)"There has been a lot of work done on fasteners and connectors in contact with treated wood in the last 8-10 years. All the testing and historical performance of stainless steel were based on the traditional use of 300 series stainless steel. Yet there are many types of stainless steel, and some are much less corrosion resistant than others. By limiting the types of stainless steel to these specific series, it ensures that the stainless steel fasteners will be corrosion resistant when exposed to treated wood."

Corrosion of fasteners has been found relatively far inland, the 15 mile requirement reduces the possibility of fastener corrosion. It is supported by the Stainless Steel Institutes recommendations.

Penetration into sheathing more than ½" thick must be at minimum ¾" or all the way through the sheathing in order to attach the product strongly enough to hold in place and prevent loosening of the fastener.


Fasteners-Asphalt E.G. Roofing Nails-7 Years


Mechanically Glavanized -2 yrs.
Saddle River, New Jersey 4-4-08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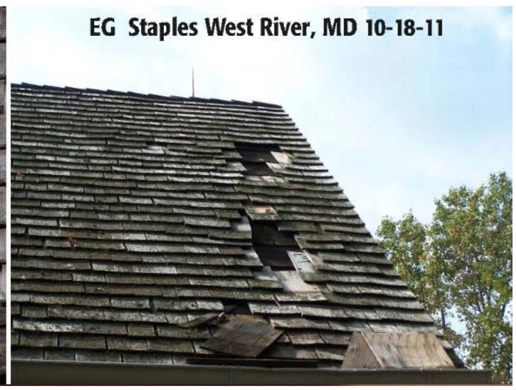
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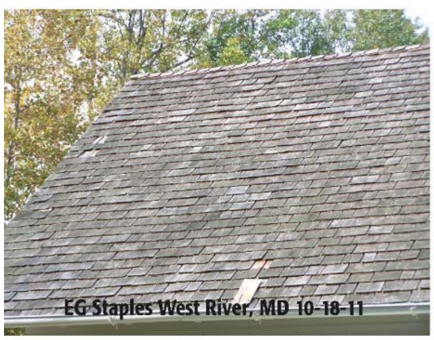
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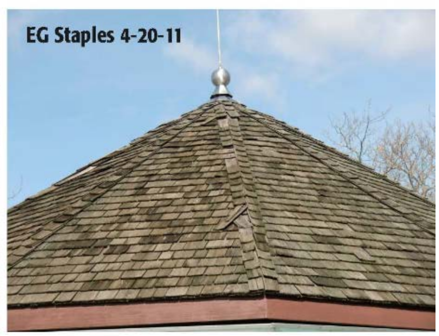
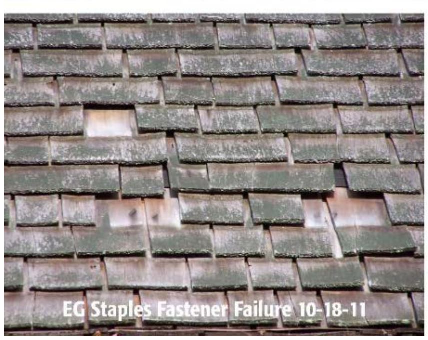

EG Staples 4-20-11


EG Staples Fastener Failure 10-18-11


EG Staples Ridge Installation I

Public Comment 6:

Jay H. Crandell, ARES Consulting, Foam Sheathing Committee of the American Chemistry Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.5.1 Application. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes or shingles shall be applied either single-course or double-course over nominal 1/2-inch (13 mm) wood-based sheathing or to furring strips over 1/2-inch (13 mm) nominal nonwood sheathing . A permeable water-resistive barrier shall be provided in accordance with Section R703.2~~. over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51 mm) and vertical overlaps of not less than 6 inches (152 mm).~~ A non-permeable water-resistive barrier shall be permitted where horizontal furring strips are used. Where horizontal furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25 mm by 76 mm or 25 mm by 102 mm), placed over the water-resistive barrier, and ~~shall be~~ fastened horizontally to the studs with minimum 7d or 8d box nails. Horizontal furring ~~and~~ shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.5.2. The spacing between adjacent shingles to allow for expansion shall be 1/8 inch (3 mm) to ¼ inch (6 mm) apart and between adjacent shakes shall be 3/8 inch (10 mm) to ½ inch (13 mm) apart. The offset spacing between joints in adjacent courses shall be a minimum of ½ inches (38 mm).

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This public comment makes the following technical improvements:

1. References water-resistive barrier requirements in Section R703.2 and removes redundant installation information in Section R703.5.1.
2. With furring strips creating a ¾-inch air-space behind the shake or shingle installation (which is an air-permeable cladding), it is unnecessary and overly restrictive to also require use of a "permeable" water-resistive barrier.
3. The furring nails should be specified as a minimum size. Larger fasteners can be necessary for adequate wind resistance and also to attach furring when installed over foam sheathing or other non-wood sheathings, especially when greater than 1/2-inch thick (for example, see separate committee-approved proposals RB389 and RB390).

RB369-13

Final Action:	AS	AM	AMPC____	D

RB370-13
R703.6.3. Chapter 44

Proposed Change as Submitted

Proponent: Theresa Weston, DuPont Building Innovations (Theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.6.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of ~~Grade D paper~~ water-resistive barrier complying with ASTM E 2556 Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.8) intended to drain to the water-resistive barrier is directed between the layers.

> **Exception:** Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of ~~60 minute Grade D paper~~ a water-resistive barrier complying with ASTM E 2556 Type II and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.

Add new standard to Chapter 44 as follows:

ASTM

E 2556 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: The proposal updates the water-resistive barrier reference to the most recent consensus standard. ASTM E2556 includes housewrap materials, building papers and felt, instead of just building paper and therefore is more representative of the state of the industry. Within ASTM E2556 Grade D paper is a Type I WRB and 60 minute Grade D paper is a Type II WRB. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers (AC-38) and therefore should not limit the use of current WRBs.

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

Analysis: A review of the standard proposed for inclusion in the code, ASTM E 2556 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB370-13

R703.6.3-RB-WESTON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM E2556 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee is concerned about the equivalency of ASTM E2556 to two layers of Grade D under stucco. Also, the standard covers products other than Grade D.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Theresa A. Weston, PhD., DuPont Building Innovations, requests Approval as Submitted.

Commenter's Reason: The proposal updates the water-resistive barrier reference to the most recent consensus standard. ASTM E2556 includes housewrap materials, building papers and felt, instead of just building paper and includes practices that are have been used for the last two decades and is therefore is more representative of the state of the industry than the current code language. Within ASTM E2556 Grade D paper is a Type I WRB and 60 minute Grade D paper is a Type II WRB. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers (AC-38) and therefore should not limit or change the use of current WRBs. In the committee's reason statement concern "about the equivalency of ASTM E2556 to two layers of Grade D under stucco" was expressed. However, this proposal makes does not allow a single layer of E2556 material to replace two layers of Grade D Paper, and in fact, clarifies that two layers of water-resistive barrier are required over wood based sheathing.

ASTM E2556 was included in the correlated section in the IBC-2015 by approval of S310-12 and so this proposal will provide consistency between the two codes.

RB370-13

Final Action: AS AM AMPC____ D

RB382-13
R703.10.1, Chapter 44

Proposed Change as Submitted

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and self

Revise as follows:

R703.10.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C 1186, Type A, minimum Grade II <u>or ISO 8336, Category A, minimum Class 2</u>. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be sealed with caulking, covered with battens or shall be designed to comply with Section R703.1. Panel siding shall be installed with fasteners according to Table R703.4 or *approved* manufacturer's installation instructions.

Add new standard to Chapter 44 as follows:

ISO

<u>8336 – Fibre-Cement Flat Sheets – Product Specification and Test Methods</u>

Reason: Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1186, *Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets*. Fiber-cement siding producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement siding products for compliance with ISO 8336. The inclusion of this Standard reference in the IBC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade. Additional editorial changes are proposed to clarify the nature of the required vertical and/or horizontal joint protection to include reference to *approved* caulking and the recognition of both vertical or horizontal shiplap joints as a means of protecting the joints as is also common with wood panel siding.

IBC Section 1405.16.1 has, as a result of the IBC Group A Code Hearings, been revised to adopt this additional Standards reference (see attached Committee Action). This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the product is already recognized for use in the Code. Reference to compliance with this alternative standard, an International Standard requiring the same performance as the ASTM Standard, will reduce barriers to trade by allowing foreign products complying with ISO 8336, Category A, minimum Class 2, market access to the United States without the need for additional product compliance documentation.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB382-13

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

R703.10.1-RB-MULDER.doc

Committee Action Hearing Results

For staff analysis of the content of ISO 8336 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The committee feels this is consistent with the action for the IBC in Group A but would urge the proponent to submit a public comment to bring it closer to alignment with the IBC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Mulder, Intertek Testing Services NA, Inc., representing James Hardie Building Products, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R703.10.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C 1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be ~~sealed~~ protected with caulking, or ~~covered~~ with battens, or flashing, or be vertical or horizontal shiplap, or otherwise ~~shall be~~ designed to comply with Section R703.1. Panel siding shall be installed with fasteners according to Table R703.4 or *approved* manufacturer's installation instructions.

Commenter's Reason: The proposed additional revisions bring this section of the IRC in to alignment with the equivalent section of the IBC, Section1405.16.1, previously approved during the April 2012 IBC Committee Hearings (see below action)

As approved for 2015 IBC:

FS170-12

For staff analysis of the content of ISO 8336-2009 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-13cycle/Proposed-A/2012ProposedStandards.pdf.

Committee Action: **Approved as Modified**

Modify proposal as follows:

1405.16.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be protected with ~~*approved*~~ caulking, or with battens, or flashing, or be vertical or horizontal shiplap, or otherwise designed to comply with Section 1403.2. Panel siding shall be installed with fasteners in accordance with the *approved* manufacturer's instructions.

RB382-13

Final Action: AS AM AMPC____ D

RB384-13
R703.11.2, R703.11.2.1, R703.11.2.2

Proposed Change as Submitted

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R703.11.2 Vinyl siding used with ~~F~~foam plastic sheathing. Vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

R703.11.2.1 ~~**Exception:**~~ Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other *approved* backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Section R703.11.1.

~~**R703.11.2.1 Basic wind speed not exceeding 90 miles per hour and Exposure Category B.** Where the basic wind speed does not exceed 90 miles per hour (40 m/s), the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 11/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, 16 inches on center. The foam plastic sheathing shall be minimum 1/2-inch-thick (12.7 mm) (nominal) extruded polystyrene per ASTM C 578, 1/2-inch-thick (12.7 mm) (nominal) polyisocyanurate per ASTM C 1289, or 1-inch-thick (25 mm) (nominal) expanded polystyrene per ASTM C 578.~~

~~**R703.11.2.2 Basic wind speed exceeding 90 miles per hour or Exposure Categories C and D.** Where the basic wind speed exceeds 90 miles per hour (40 m/s) or the Exposure Category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Tables R301.2(2) adjusted for height and exposure using Table R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:~~

1. ~~For wall assemblies with foam plastic sheathing on the exterior side and gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.~~
2. ~~For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.~~

R703.11.2.2 Where the foam plastic sheathing is installed directly over studs and the foam plastic sheathing attachment is not designed to separately resist 100% of the wind load, the design wind pressure rating of the vinyl siding shall be multiplied by 0.27 and the result shall not be less than the design wind pressure load as determined in Section 703.1.2. The vinyl siding shall be installed in accordance with the manufacturer's instructions for the design wind pressure resistance rating.

> **Exception:** For conditions where the design wind suction load as determined in Section 703.1.2 does not exceed 30 psf and the interior surface of the wall is sheathed with 1/2-in gypsum wallboard or equivalent, the design wind pressure rating of the vinyl siding shall be permitted to be multiplied by 0.30 rather than 0.27.

Reason: The proposed revisions intend to bring provisions for use of vinyl siding to secure foam plastic sheathing to resist wind suction loads more in line with requirements for sheathing products used structurally for wind resistance. Specifically, revisions are based on an assumption that the same wind suction loads applicable for securing exterior structural sheathing products to wall studs (i.e. either 100% or 90% of the wind suction loads) are also applicable for vinyl siding securing foam plastic sheathing to studs.

The following revisions are implemented: 1) removal of the 90 mph and less wind speed provisions of 703.11.2 due to inadequate wind resistance provided by the requirements when judged against standard requirements for wind design; and 2) reduction of the 0.39 wind pressure rating adjustment factor to 0.30 based on an assumption that the vinyl siding used to secure exterior foam plastic sheathing to wall studs should resist the same loads as required for design of the foam plastic sheathing to resist wind loads (i.e. 90% of the wind loads versus 70% of the wind loads associated with the 0.39 factor). Two options for use of vinyl to secure foam plastic sheathing to studs are unchanged by this proposal: the 0.27 factor in R703.11.2.2 for cases where vinyl siding secures foam plastic sheathing to studs and interior gypsum is not present; and R703.11.2.3 which relies on availability and approval of vinyl siding manufacturer's instructions specifically for use over foam plastic sheathing for wind resistance.

Proposed revisions are summarized in Table 1. Additional details on revised wind pressure rating adjustment factors, wind load requirements for other structural sheathing products, and elimination of the 90 mph and less wind speed provisions are provided below.

Table 1.Summary of proposed change

Current Section Number	Proposed Section Number	Vinyl Siding Installed over:	2012 IRC Factors			Proposed Factors			Summary
			PEF	**SF**	**WPR**	**PEF**	**SF**	**WPR**	
R703.11.2 Exception	R703.11.2.1	Foam sheathing backed by materials designed to resist 100% of wind loads	0.36	1.5	1.00	0.36	1.5	1.00	*(No Change)*
R703.11.2.1	---	Foam sheathing with Interior GWB (90 mph, Exposure B)	0.36	1.5	1.00	-	-	-	*(Deleted)*
R703.11.2.2(1)	R703.11.2.2	Foam sheathing without interior GWB	1.00	2.0	0.27	1.00	2.0	0.27	*(No Change)*
R703.11.2.2(2)	R703.11.2.2 Exception	Foam sheathing with interior GWB (limited to design pressure not exceeding 30 psf)	0.70	2.0	0.39	0.90	2.0	0.30	*(Revised)*
R703.11.2.3	R703.11.2.3	Manufacturer specification for installation over foam sheathing approved to resist 100% of wind loads	*Proprietary Systems*						*(No Change)*
PEF - Pressure Equalization Factor SF - Safety Factor WPR - Wind Pressure Rating adjustment factor WPR = 0.36*1.5/PEF/SF									

Basis of vinyl siding wind rating adjustment factors

Vinyl siding wind pressure ratings are established using provisions in ASTM D 3679 Annex 1 and assume that the vinyl siding is installed over a backing material capable of resisting 100% of the wind suction loads (i.e. PEF=1.0). In those provisions, the test pressure of 15.73 psf is established as a minimum requirement based on an assumption that the vinyl siding resists only 36% of the wind suction loads (i.e. PEF=0.36) and a safety factor of 1.5. These assumptions, referred to herein as the reference case assumptions for vinyl siding wind pressure rating, are shown in Equation 1. Equation 1 can be found in ASTM D 3679 and relates test pressure, P_t, to design pressure, D_p:

$$P_t = D_p \times 0.36 \times 1.5 \qquad \text{Eq. 1}$$

For a design suction pressure, D_p, of 29.12 lb/ft^2 associated with 110 mph wind speed, Exposure B and 30 ft mean roof height, the required test pressure, P_t, is 15.73 lb/ft^2.

In 2006, changes were brought forward to address how to use these ASTM D 3679 design wind pressure ratings when vinyl siding is installed over a backing material that can't independently resist 100% of the wind loads, such as when used over many of the foam plastic sheathing products which rely on vinyl siding and its fastening to studs to secure the foam plastic sheathing to the wall studs. At that time, a wind pressure rating adjustment factor of 0.39 was approved for applications where vinyl siding was used to secure foam plastic sheathing to wall studs based on the assumption that it was securing the foam plastic sheathing for 70% of the wind suction loads (i.e. PEF = 0.70) acting on the exterior foam plastic sheathing while the remaining 30% was assumed to be resisted by interior gypsum wallboard. In addition to accounting for increased wind loads resisted by the vinyl siding (from 36% to 70%), the 0.39 factor also accounted for an increase in safety factor from 1.5 to 2.0 in recognition of the increased importance of vinyl siding when used to structurally secure foam plastic sheathing to wall studs.

Rationale for use 0.30 adjustment factor in lieu of the 0.39 factor in R703.11.2.

Since the original code change that introduced wind pressure rating adjustment factors, progress has been made to standardize the wind resistance of foam plastic sheathing with the development of ANSI/SBCA FS 100-12 *Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies*. Notably, for applications where gypsum wallboard or equivalent material is provided as an interior finish, design of the foam plastic sheathing layer for 90% of the wind suction loads (i.e. PEF=0.90) is permitted per SBCA FS 100-12 Section 6.4 as follows:

"6.4 Pressure Equalization Factor (PEF). A PEF of 1.0 shall be required for *exterior wall sheathing* applications.

Exceptions:

1. For conditions where the design negative wind pressure load determined in accordance with Section 4.0 does not exceed 30 psf, a PEF of 0.9 shall be permitted to determine negative wind pressure resistance only for *exterior wall sheathing* on wall assemblies having an interior finish of at least 0.5-inch-thick gypsum wall board (ASTM C1396) or any material of at least equivalent bending strength, rigidity and air permeability."

Design using a PEF value of 0.9, or 90% of the wind suction loads, represents an approximate 29 percent increase in loads in the foam plastic sheathing layer relative to the 70% wind load assumption used in derivation of the 0.39 factor. Consistent with the original derivation, the vinyl siding used to secure the foam plastic sheathing to the wall studs must also be designed to resist the load for which the sheathing is designed. As a result, the 0.39 factor is reduced to 0.30 in recognition of the increase from 70% to 90% of wind loads on the foam plastic sheathing layer and resisted by the vinyl siding: 0.39 x (0.7/0.9) = 0.30. Additional information on the derivation of the 0.30 factor, consistent with assumptions in derivation of existing factors in the IRC, is provided below as additional background.

For the reference case where vinyl siding wind pressure resistance is based on installation over structural sheathing capable of resisting 100% of the wind loads, test pressure, P_t, and design pressure, D_p, are related as previously shown in Equation 1 and repeated in Equation 2 for ease of reference. In this case, vinyl siding is assumed to resist 36% of the wind loads and a safety factor of 1.5 is applicable.

$P_t = D_p(\text{reference}) \times 0.36 \times 1.5$ Eq. 2

For the structural case where vinyl siding is used to secure foam plastic sheathing to wall studs for resistance to wind suction loads, test pressure, P_t, and design pressure, D_p, are related as shown in Equation 3. In this case, vinyl siding is assumed to resist 90% of the wind loads (the same loads as used for design of the foam plastic sheathing) and a safety factor of 2 is applicable.

$P_t = D_p(\text{structural}) \times 0.90 \times 2.0$ Eq. 3

Equating P_t from Equation 2 and 3 and solving for D_p(structural) results in a factor of 0.30 as follows:

$D_p(\text{structural}) = 0.30\ D_p(\text{reference})$ Eq. 4

The PEF of 0.9 recognizes that gypsum wallboard on the interior face of the wall has been shown to resist a portion of the full wind load. It is important to note; however, that the amount resisted by the gypsum wallboard continues to be studied since the contribution is a function of the relative air permeability of the exterior wall sheathing and the interior gypsum wallboard and the relative strength and stiffness of the exterior wall sheathing and the interior gypsum wallboard to name a few variables, many of which are difficult to quantify and control at time of fabrication and over time. These are among some of the reasons why the PEF of 0.7 previously assumed for development of the 0.39 factor was increased to a PEF of 0.9 resulting in a 0.30 factor. Given the sensitivity of pressure equalization to level of pressure, relative porosity of the inside wall layer to the outside wall layer, pressures used in PEF testing, and in recognition of use of gypsum wallboard in much of the underlying PEF testing, the 0.30 adjustment is only applicable when the design wind suction load does not exceed 30 psf.

The adjustment factor of 0.27 in R703.11.2.2 remains unchanged by this proposal

Where vinyl siding is used to hold the foam plastic sheathing onto the wall studs and gypsum wallboard or equivalent interior finish is not present, the default condition in SBCA FS 100-12 applies and PEF of 1.0 is used (i.e. 100% of wind load resisted by exterior foam plastic sheathing). In this case, the vinyl siding used to secure the foam plastic sheathing to the wall studs must also be designed to resist 100% of the load, equal to the load for which the sheathing is designed. The resulting wind pressure rating factor is 0.27 and remains unchanged in the proposed revisions.

Basis for removal of the 90 mph and less wind speed provisions of current R703.11.2.1

The current provisions of R703.11.2.1 have been proposed for deletion. These provisions exempt the user from checking the wind resistance of the vinyl siding if the building is located in an area where the wind speed is 90 mph or less, Wind Exposure B, and the interior finish is gypsum wallboard. These provisions result in significantly lower wind resistance than required by section R703.1.2. For example, the wind loads associated with 90 mph Exposure B is a maximum suction (negative) pressure of 19.5 psf for a 30' mean roof height (see Table 2). The minimum required test pressure for vinyl siding in accordance with ASTM D 3679 is only 15.73 psf. In this example, the minimum required test pressure is only 80% of the design pressure. It is important to note that the minimum test pressure should substantially exceed the design pressure to provide a margin of safety.

Table 2. Design wind pressure for wall claddings and cladding attachments (psf)

Wind exposure category	Mean roof height (ft)	BASIC WIND SPEED, V_{ASD} (mph-3-second gust)							
		85		90		100		110	
		max +	max -	max +	max -	max +	max -	max +	max -
B	0-15	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	-29.1
	20	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	-29.1
	25	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	-29.1
	30	13.0	-17.4	14.6	**-19.5**	18.0	-24.1	21.8	**-29.1**
	35	13.6	-18.2	15.2	**-20.4**	18.8	-25.2	22.7	-30.5
C	0-15	15.7	-21.1	17.7	-23.6	21.8	-29.2	26.4	-35.3
	20	16.7	-22.4	18.8	-25.1	23.2	-31.0	28.0	-37.5
	25	17.5	-23.5	19.7	-26.3	24.3	-32.5	29.4	-39.3
	30	18.2	-24.4	20.4	-27.4	25.2	-33.8	30.5	-40.9
	35	18.8	-25.2	21.1	-28.3	26.1	-34.9	31.5	-42.2

Note: Design wind pressures calculated by combining wall cladding loads (for effective wind area of 10 ft^2) in Table R301.2(2) and height and exposure coefficients in Table R301.2(3). Negative (-) wind pressures represent wind suction pressures.

The extent of under-design of the vinyl siding is exacerbated when considering that 15.73 psf represents an average of 3-4 test results and does not reflect minimum values. Application of the wind pressure resistance rating described above demonstrates the extent of under-design. For the case where interior gypsum finish is present, the adjusted wind pressure resistance for the minimum vinyl siding per ASTM D 3679 becomes 0.30 x 29.1 = 8.7 psf. The value of 8.7 psf is less than half of the 19.5 psf value required for 90 mph wind speeds, Exposure B at a 30'mean roof height.

In summary, this proposal deletes the current R703.11.2.1 provisions that exempt the user from checking the wind resistance of the vinyl siding in a 90 mph Exposure B area. Both the revised section R703.11.2.2 and existing section R703.11.2.3 still remain and allow the proper installation of vinyl siding installed over foam sheathing in accordance with the vinyl siding manufacturer's installation instructions.

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

RB384-13

R703.11.2-RB-PITTS.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee felt there was no compelling reason to change what is in the code. The proposal seemed overreaching.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dennis Pitts, American Wood Council, requests Approval as Submitted.

Commenter's Reason: Vinyl siding per ASTM D3679 has its wind resistance rating established from testing over sheathing that is independently attached to studs for 100% of the wind load without the need for the siding to hold the underlying sheathing on to the studs. However, per Section R703.11.2.1 and R203.11.2.2, the vinyl siding per ASTM D3679 is used to secure foam plastic sheathing direct to wall studs for resistance to wind suction loads. The code has permitted this mis-application (when judged against requirements of ASTM D3679) of vinyl siding for some time and with wind resistance far lower than design wind pressures required by the code.

Testimony during the IRC Committee hearing was highly technical and strayed in many different directions. The primary issue, however, is that the current installation provisions in R703.11.2.1 permit attachment of exterior foam plastic sheathing with vinyl siding that has significantly lower wind resistance than is required by R703.1.2 and R602.3. Current Section R703.11.2.1 allows the securing of exterior foam plastic sheathing to wall studs with vinyl siding that has test pressure resistance that is 20% less than the minimum design wind loads (see Figure 1). Proposed revisions in RB384 would require test pressures to exceed the design wind loads with a factor of safety consistent with that provided by Section R703.11.2.2(2). A slight 10% reduction in required test pressure permitted by RB384 recognizes a load sharing effect with gypsum wallboard on the inside face of the wall assembly – consistent with the 0.90 PEF factor for design of foam plastic sheathing in *ANSI/SBCA FS100-12 Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies.*

For applications where vinyl siding is used to secure foam plastic sheathing to wall studs not sheathed on the interior with gypsum wallboard, RB384 proposes no change in test pressure requirements (e.g. 39 psf test pressure remains unchanged by RB384), and that a minimum safety factor of 2.0 is maintained (see Figure 1). RB384 also proposes no change to requirements of R703.11.2.3 where use of an approved design wind pressure rating for installation over foam plastic sheathing in accordance with the vinyl siding manufacturer's product specifications is permitted.

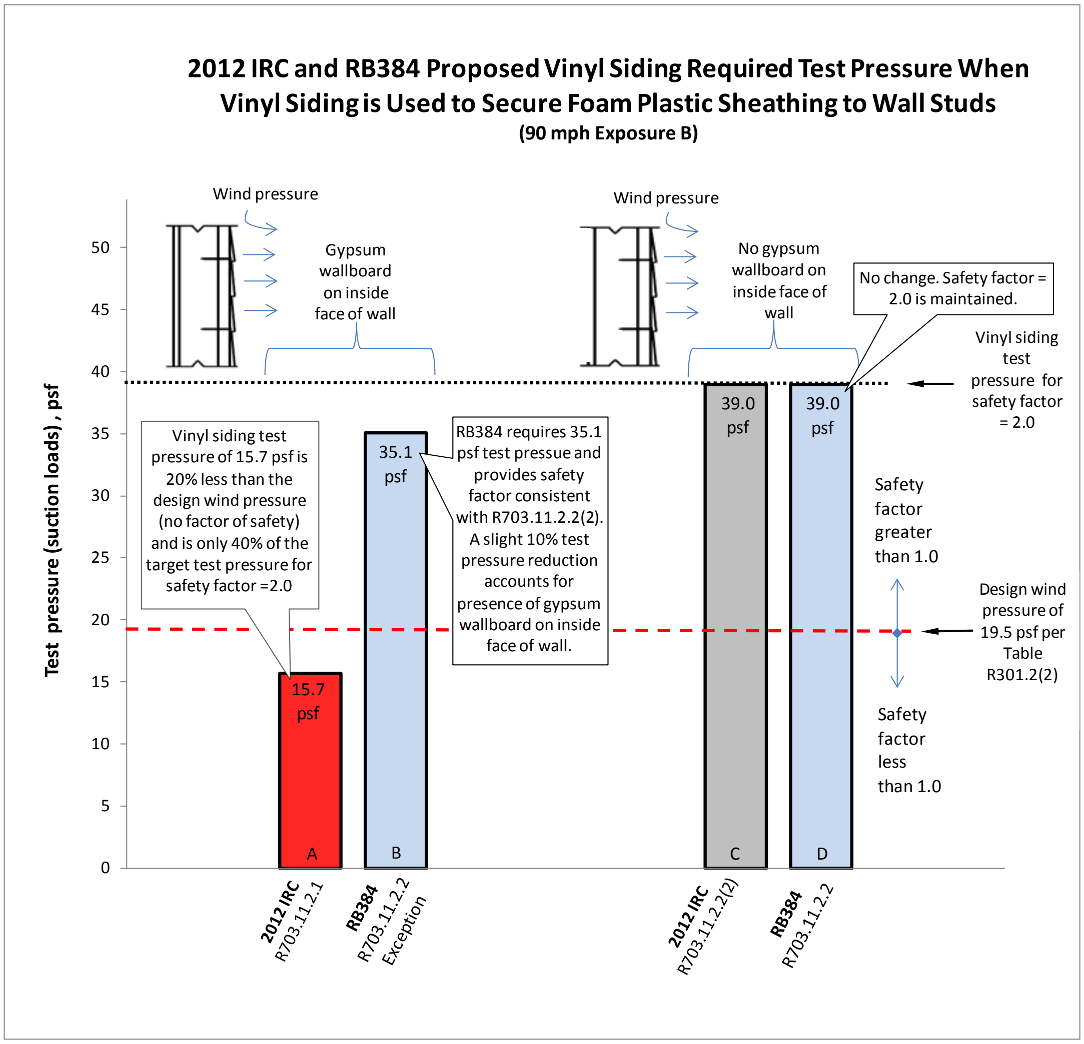


Figure 1. Comparison of vinyl siding required test pressure to design pressure under 2012 IRC and RB384.

Also, in the Reason statement provided with the original proposal, there was a typo in the section numbers in the first column of Table 1 and the description of the 30 psf limit (associated with proposed R703.11.2.2 Exception) could be incorrectly interpreted as being applicable to both the 2012 IRC and RB384. A corrected Table 1 is provided below.

Table 1. Summary of proposed change (corrected)

Current Section Number	Proposed Section Number	Vinyl Siding Installed over	2012 IRC Factors PEF	SF	WPR	Proposed Factors PEF	SF	WPR	Summary
R703.11.2 Exception	R703.11.2.1	Foam sheathing backed by materials designed to resist 100% of wind loads	0.36	1.5	1.00	0.36	1.5	1.00	*(No Change)*
R703.11.2.1	---	Foam sheathing with interior GWB (90 mph, Exposure B)	0.36	1.5	1.00	-	-	-	*(Deleted)*
R703.11.2.2(2)	R703.11.2.2	Foam sheathing without interior GWB	1.00	2.0	0.27	1.00	2.0	0.27	*(No Change)*
R703.11.2.2(1)	R703.11.2.2 Exception	Foam sheathing with interior GWB	0.70	2.0	0.39	0.90[1]	2.0	0.30	*(Revised)*
R703.11.2.3	R703.11.2.3	Manufacturer specification for installation over foam sheathing approved to resist 100% of wind loads	*Proprietary Systems*						*(No Change)*

[1] Application of this PEF is limited to cases where the limited to design pressure does not exceed 30 psf

PEF - Pressure Equalization Factor SF - Safety Factor WPR - Wind Pressure Rating adjustment factor WPR = 0.36*1.5/PEF/SF

RB384-13

Final Action: AS AM AMPC____ D

RB385-13
Table R703.4, R703.11.2

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Insulated Vinyl Siding[aa]	035 (vinyl siding layer only)	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y,z]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not Allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code.

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
c. Staples shall have a minimum crown width of $^{7}/_{16}$-inch outside diameter and be manufactured of minimum 16-gage wire.
d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
e. Aluminum nails shall be used to attach aluminum siding.
f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
g. All attachments shall be coated with a corrosion-resistant coating.
h. Shall be of approved type.
i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $^{1}/_{2}$-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1^{1}/_{2}$ inches into studs, studs and wood sheathing combined or blocking.
k. Hardboard siding shall comply with CPA/ANSI A135.6.
l. Vinyl siding shall comply with ASTM D 3679.
m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
Q . See Section R703.10.1.
r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
s. See Section R703.10.2.
t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1^{1}/_{2}$ inch long galv. roofing nail through the top edge of each plank at each stud.

u. See Section R703.2 exceptions.
v. Minimum nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.
w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners.
<u>aa. Insulated vinyl siding shall comply with ASTM D 7793.</u>

R703.11.2 Foam plastic sheathing. Vinyl siding<u> and insulated vinyl siding</u> used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

Reason: There is general consensus among manufacturers on the installation practices for insulated vinyl siding, including several requirements the can be integrated into the installation requirements in Table R703.4. Installation specifications are very similar to vinyl siding.

These include:
- Minimum thickness requirement from ASTM D7793
- That the siding must be installed over a water-resistive Barrier
- Size of nail and/or staple and penetration depth into the stud
- Provision for how it should be installed over foam sheathing
- Fastener spacing
- Installation over foam sheathing should be treated the same as vinyl siding, the principals of section R703.11.2 will apply

Additional footnotes "aa", "y" and "z" refer to the ASTM standard for insulated vinyl siding, ASTM D7793, and fastening prescriptions similar to vinyl siding involving penetration into the stud 0.75 inches and an allowance for variation to this requirement when approved by the manufacturer.

An additional reference was added to the use of vinyl siding with foam plastic sheathing to include insulated vinyl siding. The application of insulated vinyl siding with foam sheathing is the same as vinyl siding, therefore the provision can simply apply.

For more information, go to www.insulatedsiding.info.

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

RB385-13

R703.4T-RB-DOBSON.doc

<u>Committee Action Hearing Results</u>

Committee Action: Approved as Submitted

Committee Reason: Approval was based upon the proponent's published reason. Consistent with the committee action on RB386-13

Assembly Action: None

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dennis Pitts, American Wood Council, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

R703.11.2 Foam plastic sheathing. Vinyl siding ~~and insulated vinyl siding~~ used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Insulated Vinyl Siding[aa]	035 (vinyl siding layer only)	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y,z]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	0.120 nail (shank) with a 0.313 head or 16 gauge crown[y]	~~0.120 nail (shank) with a 0.313 head per Section R703.11.2~~ Not Allowed	Not Allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code.

(Portions of code proposal and Table not shown remain unchanged)

Commenter's Reason: Insulated vinyl siding is proposed to be added to R703.11.2 which would allow it to be used to structurally secure exterior foam sheathing to wall studs; however, no justification has been provided to demonstrate that it provides adequate wind resistance. Note that if RB384 is approved, then this public comment is not necessary because the required wind resistance will be increased to a more acceptable level in that proposal.

RB385-13
Final Action: AS AM AMPC____ D

RB386-13

R202 (New), R703.13 (New), R703.13.1 (Neq), Chapter 44

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Add new text as follows:

703.13 Insulated vinyl siding. Insulated vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D7793 by an approved quality control agency.

703.13.1 Insulated vinyl siding and accessories. Insulated vinyl siding and accessories shall be installed in accordance with manufacturer's installation instructions.

Add new definition as follows:

INSULATED VINYL SIDING. A vinyl cladding product with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a minimum thermal resistance of R-2.

Add new standard to Chapter 44 as follows:

ASTM

D 7793 – 12 Standard Specification for Insulated Vinyl Siding

Reason: This definition is based on the current ASTM standard for insulated vinyl siding, ASTM D7793. Insulated vinyl siding has been available for over ten years and is now certified to an ASTM standard by an approved quality control agency. Therefore, it makes sense to introduce the standard and third party certification into the code as insulated vinyl siding grows and is embraced as a form of a cladding and home insulation. Performance requirements are specified by ASTM, ensuring that insulated vinyl siding can meet the necessary demands as a cladding and home insulation.

This change also provides a method for building officials to verify that insulated vinyl siding is code compliant, since there are separate standards for vinyl siding and insulated vinyl siding.

- Insulated vinyl siding is vinyl siding with rigid foam insulation laminated or permanently attached to the panel.
- In energy codes and energy efficiency programs, insulated siding is recognized as a form of "continuous insulation," or insulation installed on the exterior of the building that helps reduce energy loss through framing or other building material.
- Insulated siding products that bear the Certified Insulated Siding Label and are found on VSI's *Official List of Certified Products and Colors* have been independently certified by a third-party, accredited quality control agency to meet or exceed ASTM D7793.

Certified insulated vinyl siding**:**

- Meets or exceeds the industry standard for quality and performance (ASTM D7793), as verified by an independent, accredited quality control agency through twice yearly, unannounced plant inspections, product testing and quality review.
- Has demonstrated a minimum thermal resistance, or R-value, of at least R-2.0, as verified by an independent quality control agency.
- Withstands the impacts of recommended installation procedures.
- Lies straight on a flat wall and does not buckle under normal conditions.
- Weathers the effects of sunshine, rain and heavy winds of at least 110 mph.
- Meets manufacturer's advertised specifications for length, width, thickness and gloss.
- Can be identified by a variety of program logos and/or labels.
- Meets or exceeds the industry standard for performance (ASTM D7793), as verified by an independent, accredited quality control agency through twice yearly, unannounced plant inspections, product testing and quality review.

Fire Performance

Due to vinyl's chlorine base, the siding portion of insulated siding does not readily ignite and burn and resists flame spread. Vinyl siding routinely demonstrates a Class A flame spread rating (that is, a flame spread index of 25 or less when tested under ASTM E84). Rigid vinyl will not sustain combustion without an external source of heat and will tend to self-extinguish if that heat is removed. Foam plastics used in the insulation portion contain a flame retardant designed to limit rapid flame spread. Foam plastic insulation products are tested and classified for flame spread and smoke-development under ASTM E84/UL 723 by Underwriters Laboratories and other certified agencies.

Moisture Performance

Insulated siding provides a supplemental rain screen that reduces the amount of water that reaches the underlying water-resistive barrier. With a properly applied water-resistive barrier, insulated siding minimizes moisture penetration from the exterior into the wall assembly and provides a way for moisture to readily drain and dry. The presence of a layer of thermal insulation filling the space between the insulated siding and the wall sheathing also aids in the moisture management system.

For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will increase the cost of construction. This change will have minimal cost impact as there are products on the market certified.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7793 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

R703.13 (NEW) #2-RB-DOBSON.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM D7793-12 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Matthew Dobson, representing Vinyl Siding Institute, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

D 7793 – ~~12~~13 Standard Specification for Insulated Vinyl Siding

Commenter's Reason: This change simply modifies the approved change to ensure the code has most up to date version of this standard. Over the course of the past few months the standard has been updated to include refinement of certain testing protocols necessary to ensure proper product evaluation including: 1) alternative test methods for demonstrating adhesive qualification; 2) the effect of differential thermal expansion is handled through distortion testing rather than through thermal expansion coefficient; and 3) evaluation of laps for siding that does not include laps, such as vertical siding, is eliminated. By referencing this 13 standard vs. the 12 standard these important refinements will be included and certified products will be consistent with the code requirements.

RB386-13
Final Action: AS AM AMPC____ D

RB387-13

R202 (NEW), Table R703.4, R703.13 (NEW), R703.13.1 (NEW), R703.13.1.1 (NEW), R703.13.1.2 (NEW), R703.13.2 (NEW), R703.13.2.1 (NEW), Chapter 44

Proposed Change as Submitted

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS[a] (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Polypropylene Siding[aa]	Not applicable.	Lap	Yes	Section 703.13.1	Not Allowed	As specified by the manufacturer instructions, test report or other sections of this code.	Polypropylene Siding[aa]	Not applicable.	Lap

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
c. Staples shall have a minimum crown width of $^{7}/_{16}$-inch outside diameter and be manufactured of minimum 16-gage wire.
d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
e. Aluminum nails shall be used to attach aluminum siding.
f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
g. All attachments shall be coated with a corrosion-resistant coating.
h. Shall be of approved type.
i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $^{1}/_{2}$-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1^{1}/_{2}$ inches into studs, studs and wood sheathing combined or blocking.
k. Hardboard siding shall comply with CPA/ANSI A135.6.
l. Vinyl siding shall comply with ASTM D 3679.
m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1^{1}/_{2}$ inches.
p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
q. See Section R703.10.1.
r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
s. See Section R703.10.2.

t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1^1/_2$ inch long galv. roofing nail through the top edge of each plank at each stud.
u. See Section R703.2 exceptions.
v. Minimum nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.
w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
aa. Polypropylene siding shall comply with ASTM D7254.

703.13 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 by an approved quality control agency.

703.13.1 Polypropylene siding and accessories shall be installed in accordance with manufacturer's installation instructions.

703.13.1.1 Polypropylene siding shall be installed over and attached to sheathing or other substrate, composed of wood or wood-based material with minimum thickness of 7/16 -inch, or other materials and fasteners having equivalent withdrawal resistance.

703.13.1.2 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120 shank and minimum 0.313 head diameter and fully penetrate sheathing or penetrate the substrate a minimum 3/4 inch. The end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing or nailable sheathing. Staples are not permitted.

703.13.2 Polypropylene siding shall comply with section 703.13.2.1

703.13.2.1 Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls not closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

Add new definition as follow:

POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases contains fillers or reinforcements, that is used to clad *exterior walls* or buildings.

Add new standard to Chapter 44 as follows:

ASTM

D 7254 Standard Specification for Polypropylene (PP) Siding

Reason: This change mirrors requirements for polypropylene siding in the 2012/2015 International Building Code (IBC), by adding them to the International Residential Code.
This provision sets minimum performance requirements for polypropylene siding and requires a third party quality control agency to verify compliance to an internationally accepted ASTM standard. Additionally, confusion in the marketplace and by building officials on use of polypropylene siding vs. vinyl siding is removed, as appropriate installation and use of polypropylene siding are detailed. The proposed definition conforms to the definition in the IBC and ASTM D7254 standard. Use of polypropylene siding is also limited on walls that face each other in high density settings, similar to the intent of the requirement in the IBC.
Not all polypropylene siding products on the market today are third party certified to internationally accepted standards which set minimum performance; our industry believes there should be minimum performance requirements for compliance with the building code.

The *VSI Product Certification Program* added certification of polypropylene siding in 2010. Additionally, several manufacturers have code compliant evaluation reports for their products. The *VSI Product Certification Program* allows manufacturers to certify, with independent third-party verification by an approved quality control agency, that certain polypropylene siding meets or exceeds the ASTM D7254 Standard Specification for Polypropylene (PP) Siding. The program is not exclusive to VSI members and any manufacturer can participate. It has been in place since 1998 when vinyl siding certification began.
Polypropylene siding certified through the program is verified by a third-party, approved quality control agency to meet or exceed the ASTM D7254 Standard Specification for Polypropylene (PP) Siding. Certified polypropylene siding is tested to:

- Weather the elements over time without cracking, chipping, flaking, pitting, or peeling.
- Meet impact resistance requirements.
- Withstand wind pressures equivalent to 110 mph or more.
- Demonstrate flame spread performance equivalent to or better than wood materials commonly used in building construction.

Although polypropylene siding panels are specific to each manufacturer, there is general consensus among manufacturers on several installation requirements. These include:

- Use of a water-resistive barrier
- Substrate installed with polypropylene siding panels, typically OSB or plywood, must have a minimum fastener withdrawal resistance because fastener spacing varies from 5 inches to 12 inches. The fasteners must have a substrate to penetrate because they will not penetrate studs in most cases because of the typical 16 inch on center spacing.
- No attachment directly over studs
- Fastener size and length are specified; staples are not allowed
- Manufacturer specified fastener spacing

Specifications for installation, including underlayment and fasteners, are necessary for polypropylene siding, so building officials and specifiers recognize the differences between installation of vinyl siding and polypropylene siding.
For more information on polypropylene siding, go to http://www.polypropylenesiding.org/.

Cost Impact: This change will have minimal cost impact as many products on the market are already certified.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7254 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB387-13

R703.13 (NEW) #1-RB-DOBSON.doc

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

For staff analysis of the content of ASTM D7254-07 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: Approved as Modified

Modify the proposal as follows:

R703.13 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 by an approved quality control agency.

R703.13.1 Polypropylene siding and accessories shall be installed in accordance with manufacturer's installation instructions.

R703.13.1.1 Polypropylene siding shall be installed over and attached to wood structural panel sheathing ~~or other substrate, composed of wood or wood-based material~~ with minimum thickness of 7/16 -inch~~,~~ or other substrate, composed of wood or wood-based material ~~materials~~ and fasteners having equivalent withdrawal resistance.

R703.13.1.2 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120 shank and minimum 0.313 head diameter. Nails shall be a minimum of 1 1/4'" long or as necessary to ~~and fully~~ penetrate sheathing or ~~penetrate the~~ substrate a minimum 3/4 inch. Where the nail fully penetrates the sheathing or nailable substrate, the ~~The~~ end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing or ~~nailable sheathing~~. Substrate. Staples are not permitted.

~~**703.13.2** Polypropylene siding shall comply with section 703.13.2.1~~

~~**703.13.2.1**~~ **R703.13.2** Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls ~~not~~ closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

Committee Reason: This change introduces a new product and a new standard into the code. The modification clarifies the text and adds a minimum length for the nails.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M Hirschler, GBH International, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.13.2 Polypropylene siding shall comply with section 703.13.2.1 or section 703.13.2.2.

~~**R703.13.2**~~ **R703.13.2.1** Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls not closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

R703.13.2.2 The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This change is essential for 2 reasons: (a) this brings the IRC into consistency with the IBC and (b) this will provide the necessary incentive for manufacturers to develop a polypropylene (PP) siding product that is actually safe in the case of fire.

In the absence of this section the IRC would introduce a dangerous product with some protection (10 feet separation) but no incentive for manufacturers to make an alternate product that has a lower flame spread index.

This proposed language is consistent not only with the IBC (2012) but also with requirements in the IBC (2015) for plastic composite decking and proposed language in the IRC (2015), accepted by the committee, for the same type of material.

Some data showing the problems associated with the polypropylene siding that meets the ASTM E84 200 flame spread index while melting ahead of the flame front were presented at the proposal stage in proposal RB388 and are repeated here. Further new information is added also.

A key issue continues to be the fact that polypropylene, unless properly modified, melts and causes flames that generate a pool fire from which the material can radiate heat energy to neighboring buildings. Since PP generates extremely high heat release when it burns (much higher than the vast majority of plastics and certainly than any plastic used exposed in construction), the probability of it causing ignition of siding in nearby buildings cannot be excluded. Note that PP is not allowed to be used exposed inside buildings (section 803.12 of the IBC 2012) unless it passes a test much more severe than the one recommended here: NFPA 286.

It is easy for the consumer to confuse PP siding with vinyl siding, especially since most retailers carry them together. However, PP siding is very different in fire performance than either vinyl siding or wood (cedar) siding. The table below shows recent fire tests on two different PP siding materials and on a wood (cedar) siding using the cone calorimeter, ASTM E1354, at an incident heat flux of 25 kW/m^2, as well as some material tests on vinyl (PVC) and on a fire retarded polypropylene.

Cone Calorimeter (ASTM E1354) Tests at 25 kW/m^2 incident heat flux		
	Peak Heat Release Rate (in kW/m^2)	**Effective Heat of Combustion (in MJ/kg)**
Siding Tests		
Cedar siding	309	13
PP siding	546	25
PP siding 2	878	32
Material Tests		
Vinyl (PVC)	190	9
FR Polypropylene	200	25

The table below shows that polypropylene can be made so that it meets the requirements indicated above, in the ASTM E84 test without melting, and perform just like PVC (vinyl) or wood products.

ASTM E84 (Steiner tunnel) tests on some exemplar materials		
Material	**Flame Spread Index**	**Flaming on Floor Ahead of Flame Front**
PVC (vinyl)	10	None
FR Polypropylene	50	None
Western red cedar	70	None
Douglas fir	70-100	None
Western white pine	75	None

The data below is a table from NFPA 556 (Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles) showing that PP can be made with better fire properties with a variety of systems, but the industry needs incentives to manufacture such safer polypropylene siding.

Table 11.2.4.2(b) Cone Calorimeter Data for Nine Fire-Retarded Polypropylene Materials at Heat Flux Indicated (in kW/m^2)

	t_{ig} (sec)	$PHRR_a$ (kW/m^2)	FPI (sec m^2/kW)	$HRR_{180\ sec}$ (kW/m^2)	$H_{c,\ eff}$ (MJ/kg)	Mass Loss (percent)
At 20 kW/m^2						
# 1	382	236	1.62	183	23.6	68
# 2	325	168	1.93	136	29.8	64
# 3	377	207	1.82	173	24.4	65
# 4	384	195	1.97	157	25.3	65
# 5	396	301	1.32	199	24.3	63
# 6	387	215	1.80	131	25.9	64
# 7	402	228	1.76	185	27.1	61
# 8	377	207	1.82	173	26.8	61
# 9	386	202	1.91	173	27.8	61
At 40 kW/m^2						
# 1	80	243	0.33	170	23.9	68
# 2	63	206	0.31	144	28.6	66
# 3	62	209	0.30	167	25.2	68
# 4	72	206	0.35	144	25.4	67
# 5	74	231	0.32	160	25.2	65
# 6	70	193	0.36	155	26.1	66
# 7	75	193	0.39	138	25.9	66
# 8	71	188	0.38	139	25.8	66
# 9	67	172	0.39	127	25.7	66

The IBC (2012) reads as follows:

IBC 1404.12 Polypropylene siding. *Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 and those of Section 1404.12.1 or 1404.12.2 by an approved quality control agency. Polypropylene siding shall be installed in accordance with the requirements of Section 1405.18 and in accordance with the manufacturer's installation instructions. Polypropylene siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.*

IBC 1404.12.1 Flame spread index. *The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.*

IBC 1404.12.2 Fire separation distance. *The fire separation distance between a building with polypropylene siding and the adjacent building shall be no less than 10 feet (3048 mm).*

RB387-13

Final Action: AS AM AMPC____ D

RB392-13

R703.2, R703.3, Table R703.3 (New), R703.3.1, R703.3.2, R703.4, Table R703.4, R703.3.1, R703.3.2, R703.3.3 (New), R703.5.1 (New), R703.8, R703.12, R703.12.3 (New)

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. ~~Under exterior wall finish materials as permitted in Table R703.4.~~

~~3~~ 2. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

~~R703.4~~ R703.3 Nominal thickness and attachments. ~~Unless specified otherwise, all~~ The nominal thickness and attachment of exterior wall coverings shall be ~~securely fastened~~ in accordance with Table ~~R703.4~~ R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions ~~or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners~~. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings shall be in accordance with Section R703.3.2

R703.3.1 Wind limitations. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R703.3.2 Fasteners. Exterior wall coverings shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3 or with other *approved* corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F 1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16 gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding per ANSI/APA-PRP 210, fiber-cement panel siding, and fiber-cement lap siding installed over foam plastic sheathing shall penetrate a minimum of 1-1/2 inches into framing or shall be in accordance with the manufacturer's installation instructions.
2. Fasteners for hardboard panel and lap siding shall penetrate a minimum of 1-1/2 inches into framing.
3. Fasteners for vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. Where approved by the manufacturer's instructions or test report, vinyl siding shall be permitted to be installed with fasteners penetrating not less than .75 inches through wood or wood structural sheathing with or without penetration into the framing. Fasteners for vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding installed over fiberboard or gypsum sheathing or direct to studs shall penetrate a minimum of 1-1/4 inches into framing.
4. Fasteners for vertical or horizontal wood siding shall penetrate a minimum of 1-1/2 inches into studs, studs and wood sheathing combined, or blocking.
5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined as specified above.

~~R703.8~~ R703.4 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
   - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
   - 1.2. In accordance with the flashing design or method of a registered design professional.
   - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

~~R703.3~~ R703.5 Wood, hardboard and wood structural panel siding. Wood, hardboard, and wood structural panel siding shall be installed in accordance with this section and Table R703.3. Hardboard siding shall comply with CPA/ANSI A135.6.

R703.5.1 Vertical wood siding. Wood siding applied vertically shall be nailed to horizontal nailing strips or blocking set no more than 24 inches on center.

~~R703.3.1~~ **R703.5.2 Panel siding.** 3/8” wood structural panel siding shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. 7/16” wood structural panel siding or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.

Joints in wood, hardboard or wood structural panel siding shall be made as follows unless otherwise approved. Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panel sheathing is used, and shall be shiplapped or covered with a batten. Horizontal joints in panel siding shall be lapped a minimum of 1 inch (25 mm) or shall be shiplapped or shall be flashed with Z-flashing and occur over solid blocking, wood or wood structural panel sheathing.

~~R703.3.2~~ **R703.5.3 Horizontal wood siding.** Horizontal lap siding shall be installed in accordance with the manufacturer’s recommendations. Where there are no recommendations the siding shall be lapped a minimum of 1 inch (25 mm), or 1/2 inch (13 mm) if rabbeted, and shall have the ends caulked, covered with a batten or sealed and installed over a strip of flashing.

R703.12 Adhered masonry veneer installation. Adhered masonry veneer shall comply with the requirements of Section R703.6.3. Adhered masonry veneer shall be attached in accordance with Section R703.6.1 or the manufacturer’s instructions. Adhered masonry veneer shall be installed in accordance with Sections 6.1 and 6.3 of TMS 402/ACI 530/ASCE 5 or the manufacturer’s instructions.

R703.12.3 Water-resistive barrier. ~~The~~ A water-resistive barrier shall be installed~~,~~ as required by Section R703.2 and shall comply with the requirements of Section R703.6.3. The water-resistive barrier ~~Table R703.4, Footnote w,~~ shall lap over the exterior of the attachment flange of the screed or flashing provided in accordance with Section R703.12.2.

TABLE R703.3
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL		NOMINAL THICKNESS(inches)	JOINT TREAT-MENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Anchored veneer: brick, concrete, masonry or stone (See Section R703.7)		2	Per Section R703.7	Per Section R703.7					
Adhered veneer: concrete, stone or masonry (See Section R703.12)		—	Per Section R703.12	Per Section R703.12					
Fiber-cement siding	Panel siding (See Section R703.10.1)	5/16	(Per Section R703.10.1)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	4d common (1½” x 0.099”)	6” panel edges 12” inter. sup.
	Lap siding (See Section R703.10.2)	5/16	(Per Section R703.10.2)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”)	6d common (2” x 0.113”) or 11 gage roofing nail	Note f
Hardboard panel		7/16	—	0.120”	0.120” nail	0.120”	0.120”	0.120” nail	6” panel

SIDING MATERIAL		NOMINAL THICKNESS(inches)	JOINT TREAT-MENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
siding (See Section R703.3)				nail (shank) with 0.225” head	(shank) with 0.225” head	nail (shank) with 0.225” head	nail (shank) with 0.225” head	(shank) with 0.225” head	edges 12” inter. sup.[d]
Hardboard lap siding (See Section R703.3)		7/16	Note e	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	0.099” nail (shank) with 0.240” head	Same as stud spacing 2 per bearing
Horizontal aluminum[a]	Without insulation	0.019[b]	Lap	Siding nail 1½” x 0.120”	Siding nail 2” x 0.120”	Siding nail 2” x 0.120”	Siding nail 1½” x 0.120”	Not allowed	Same as stud spacing
		0.024	Lap	Siding nail 1½” x 0.120”	Siding nail 2” x 0.120”	Siding nail 2” x 0.120”	Siding nail 1½” x 0.120”	Not Allowed	
	With insulation	0.019	Lap	Siding nail 1½” x 0.120”	Siding nail 2½” x 0.120”	Siding nail 2½” x 0.120”	Siding nail 1½” x 0.120”	Siding nail 1½” x 0.120”	
Particleboard panels		3/8	—	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	Not allowed	6” panel edges 12” inter. sup.
		1/2	—	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	
		5/8	—	6d box nail (2” x 0.099”)	8d box nail (2½” x 0.113”)	8d box nail (2½” x 0.113”)	6d box nail (2” x 0.099”)	6d box nail (2” x 0.099”)	
Steel[c]		29 ga.	Lap	Siding nail (1¾” x 0.113”) Staple–1¾”	Siding nail (2¾” x 0.113”) Staple–2½”	Siding nail (2½” x 0.113”) Staple–2¼”	Siding nail (1¾” x 0.113”) Staple–1¾”	Not allowed	Same as stud spacing
Vinyl siding (See Section R703.11)		0.035	Lap	0.120” nail (shank) with a 0.313” head or 16 gauge staple with	0.120” nail (shank) with a 0.313” head or 16 gauge staple with 3/8 to ½-inch crown	0.120” nail (shank) with a 0.313” head or 16 gauge staple with 3/8	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report

SIDING MATERIAL		NOMINAL THICKNESS(inches)	JOINT TREAT-MENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
				3/8 to ½-inch crown		to ½-inch crown			
Wood siding (See Section R703.3)	Wood rustic, drop	3/8 Min	Lap	6d box or siding nail (2” x 0.099”)	6d box or siding nail (2” x 0.099”)	6d box or siding nail (2” x 0.099”)	6d box or siding nail (2” x 0.099”)	8d box or siding nail (2½” x 0.113”) Staple–2”	Face nailing up to 6” widths, 1 nail per bearing; 8” widths and over, 2 nails per bearing
	Shiplap	19/32 Average	Lap						
	Bevel	7/16							
	Butt tip	3/16	Lap						
Wood structural panel ANSI/APA PRP-210 siding (exterior grade) (See Section R703.3)		3/8 – 1/2	Note e	2” x 0.099” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2” x 0.099” siding nail	6” panel edges 12” inter. sup.
Wood structural panel lapsiding (See Section R703.3)		3/8 – 1/2	Note e Note g	2” x 0.099” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2½” x 0.113” siding nail	2” x 0.099” siding nail	8” along bottom edge

For SI: 1 inch = 25.4 mm.

a. Aluminum nails shall be used to attach aluminum siding.
b. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
c. Shall be of approved type.
d. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 11 gage 1½ inch long galv. roofing nail through the top edge of each plank at each stud in accordance with the manufacturer’s installation instruction.
g. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.

~~TABLE R703.4~~
~~WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS~~

~~SIDING MATERIAL~~		~~NOMINAL THICKNESS[a] (inches)~~	~~JOINT TREATMENT~~	~~WATER-RESISTIVE BARRIER REQUIRED~~	~~TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]~~					
					~~Wood or wood structural panel sheathing into stud~~	~~Fiberboard sheathing into stud~~	~~Gypsum sheathing into stud~~	~~Foam plastic sheathing into stud~~	~~Direct to studs~~	~~Number or spacing of fasteners~~
~~Horizonal aluminum[e]~~	~~Without insulation~~	~~0.019[f] 0.024~~	~~Lap~~	~~Yes~~	~~0.120 nail 1½ long~~	~~0.120 nail 2 long~~	~~0.120 nail 2 long~~	~~0.120 nail[y]~~	~~Not allowed~~	~~Same as stud spacing~~
			~~Lap~~	~~Yes~~	~~0.120 nail 1½ long~~	~~0.120 nail 2 long~~	~~0.120 nail 2 long~~	~~0.120 nail[y]~~	~~Not allowed~~	
	~~With insulation~~	~~0.019~~	~~Lap~~	~~Yes~~	~~0.120 nail 1½ long~~	~~0.120 nail 2½ long~~	~~0.120 nail 2½ long~~	~~0.120 nail[y]~~	~~0.120 nail 1½ long~~	
~~Anchored veneer: brick, concrete, masonry or stone~~		~~2~~	~~Section R703~~	~~Yes~~	~~See Section R703 and Figure R703.7[g]~~					

~~SIDING MATERIAL~~	~~NOMINAL THICKNESS[a] (inches)~~	~~JOINT TREATMENT~~	~~WATER-RESISTIVE BARRIER REQUIRED~~	~~TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[b, c, d]~~					
				~~Wood or wood structural panel sheathing into stud~~	~~Fiberboard sheathing into stud~~	~~Gypsum sheathing into stud~~	~~Foam plastic sheathing into stud~~	~~Direct to studs~~	~~Number or spacing of fasteners~~
~~Adhered veneer: concrete, stone or masonry[w]~~	—	~~Section R703~~	~~Yes Note w~~	~~See Section R703.6.1[g] or in accordance with the manufacturer's instructions.~~					
~~Hardboard[k] Panel siding-vertical~~	~~$^{7}/_{16}$~~	—	~~Yes~~	~~Note m~~	~~Note m~~	~~Note m~~	~~Note m~~	~~Note m~~	~~6□panel edges 12□ inter. sup.[n]~~
~~Hardboard[k] Lap-siding-horizontal~~	~~$^{7}/_{16}$~~	~~Note p~~	~~Yes~~	~~Note o~~	~~Note o~~	~~Note o~~	~~Note o~~	~~Note o~~	~~Same as stud spacing 2 per bearing~~
~~Steel[h]~~	~~29 ga.~~	~~Lap~~	~~Yes~~	~~0.113 nail 1$^{3}/_{4}$□ Staple-1$^{3}/_{4}$□~~	~~0.113 nail 2$^{3}/_{4}$□ Staple-2$^{1}/_{2}$□~~	~~0.113 nail 2$^{1}/_{2}$□ Staple-2$^{1}/_{4}$□~~	~~0.113 nail[v] Staple[v]~~	~~Not allowed~~	~~Same as stud spacing~~
~~Particleboard panels~~	~~$^{3}/_{8}$ – $^{1}/_{2}$~~	—	~~Yes~~	~~6d box nail (2□× 0.099□)~~	~~6d box nail (2□× 0.099□)~~	~~6d box nail (2□× 0.099□)~~	~~box nail[v]~~	~~6d box nail (2□× 0.099□), $^{3}/_{8}$ not allowed~~	~~6□panel edge, 12" inter. sup.~~
	~~$^{5}/_{8}$~~	—	~~Yes~~	~~6d box nail (2□× 0.099□)~~	~~8d box nail (2$^{1}/_{2}$□× 0.113□)~~	~~8d box nail (2$^{1}/_{2}$□× 0.113□)~~	~~box nail[v]~~	~~6d box nail (2□" × 0.099□)~~	
~~Wood structural panel[i] ANSI/APA-PRP 210 siding[i] (exterior grade)~~	~~$^{3}/_{8}$ — $^{1}/_{2}$~~	~~Note p~~	~~Yes~~	~~0.099 nail-2□~~	~~0.113 nail-2$^{1}/_{2}$□~~	~~0.113 nail-2 $^{1}/_{2}$□~~	~~0.113 nail[v]~~	~~0.099 nail-2□~~	~~6□panel edges, 12□ inter. sup.~~
~~Wood structural panel lapsiding~~	~~$^{3}/_{8}$ — $^{1}/_{2}$~~	~~Note p Note x~~	~~Yes~~	~~0.099 nail-2□~~	~~0.113 nail-2$^{1}/_{2}$□~~	~~0.113 nail-2 $^{1}/_{2}$□~~	~~0.113 nail[x]~~	~~0.099 nail-2□~~	~~8□along bottom edge~~
~~Vinyl siding[l]~~	~~0.035~~	~~Lap~~	~~Yes~~	~~0.120 nail (shank) with a 0.313 head or 16-gage staple with $^{3}/_{8}$ to $^{1}/_{2}$-inch crown[y, z]~~	~~0.120 nail (shank) with a 0.313 head or 16-gage staple with $^{3}/_{8}$ to $^{1}/_{2}$-inch crown[y]~~	~~0.120 nail (shank) with a 0.313 head or 16-gage staple with $^{3}/_{8}$ to $^{1}/_{2}$-inch crown[y]~~	~~0.120 nail (shank) with a 0.313 head per Section R703.11.2~~	~~Not allowed~~	~~16 inches on center or specified by the manufacturer instructions or test report~~
~~Wood[j] rustic, drop~~	~~$^{3}/_{8}$ Min~~	~~Lap~~	~~Yes~~	~~Fastener penetration into stud-1□~~				~~0.113 nail-2$^{1}/_{2}$□ Staple-2□~~	~~Face nailing up to 6□ widths, 1 nail per bearing; 8□widths and over, 2 nails per~~

~~SIDING MATERIAL~~		~~NOMINAL THICKNESS~~[a] ~~(inches)~~	~~JOINT TREATMENT~~	~~WATER-RESISTIVE BARRIER REQUIRED~~	~~TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS~~[b, c, d] ~~Wood or wood structural panel sheathing into stud~~	~~Fiberboard sheathing into stud~~	~~Gypsum sheathing into stud~~	~~Foam plastic sheathing into stud~~	~~Direct to studs~~	~~Number or spacing of fasteners~~
										~~bearing~~
~~Shiplap~~	~~$^{19}/_{32}$ Average~~	~~Lap~~	~~Yes~~	~~Fastener penetration into stud-1"~~					~~0.113 nail-2$^{1}/_{2}$" Staple-2"~~	~~Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing~~
~~Bevel~~	~~$^{7}/_{16}$~~									
~~Butt tip~~	~~$^{3}/_{16}$~~	~~Lap~~	~~Yes~~							
~~Fiber cement panel siding~~[q]	~~$^{5}/_{16}$~~	~~Note q~~	~~Yes Note u~~		~~6d common corrosion-resistant nail~~[f]	~~6d common corrosion-resistant nail~~[f]	~~6d common corrosion-resistant nail~~[f]	~~6d common corrosion-resistant nail~~[f, v]	~~4d common corrosion-resistant nail~~[f]	~~6" o.c. on edges, 12" o.c. on intermed. studs~~
~~Fiber cement lap siding~~[s]	~~$^{5}/_{16}$~~	~~Note s~~	~~Yes Note u~~		~~6d common corrosion-resistant nail~~[f]	~~6d common corrosion-resistant nail~~[f]	~~6d common corrosion-resistant nail~~[f]	~~6d common corrosion-resistant nail~~[f, v]	~~6d common corrosion-resistant nail or 11-gage roofing nail~~[f]	~~Note t~~

~~For SI: 1 inch = 25.4 mm.~~

~~a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.~~

~~b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.~~

~~c. Staples shall have a minimum crown width of $^{7}/_{16}$-inch outside diameter and be manufactured of minimum 16-gage wire.~~

~~d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.~~

~~e. Aluminum nails shall be used to attach aluminum siding.~~

~~f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.~~

~~g. All attachments shall be coated with a corrosion-resistant coating.~~

~~h. Shall be of approved type.~~

~~i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $^{1}/_{2}$-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.~~

~~j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate 1$^{1}/_{2}$ inches into studs, studs and wood sheathing combined or blocking.~~

~~k. Hardboard siding shall comply with CPA/ANSI A135.6.~~

~~l. Vinyl siding shall comply with ASTM D 3679.~~

~~m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing 1$^{1}/_{2}$ inches.~~

~~n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.~~
~~o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.~~
~~p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.~~
~~q. See Section R703.10.1.~~
~~r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.~~
~~s. See Section R703.10.2.~~
~~t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1^1/_2$ inch long galv. roofing nail through the top edge of each plank at each stud.~~
~~u. See Section R703.2 exceptions.~~
~~v. Minimum nail length must accommodate sheathing and penetrate framing $1^1/_2$ inches.~~
~~w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.~~
~~x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.~~
~~y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.~~

Reason: The purpose of this code change is to replace the existing Table R703.4 with a revised and simplified version and improve the code text relating to siding attachment. While reviewing several code change proposals last cycle dealing with siding attachment, we identified a number of conflicts between the table and code text, as well as discovering several errata. Additionally, we found the 2009 IRC version of the table hard to work with because of the small font and the extensive footnotes. The 2012 version of the table was printed in a larger font in an effort to improve readability, but this has not fixed all of the issues and we have identified new errata. This code change replaces the table with a new version and introduces new charging language and additional code revisions to move material from footnotes to the main body of the code where they can be more easily located. The key changes are as follows:

(1) Existing Section R703.4 is clarified and revised. The nail requirement is relocated to a new subsection. Footnote (a) is moved to the section. The entire section is moved to become R703.3, placing it immediately following the WRB section ahead of the wood siding section.
(2) To the extent possible, nail specifications are formatted to match the standard used in Table R602.3(1) and elsewhere, where the nail type is specified, followed by the length x shank diameter.
(3) A new Section R703.3.2 on fasteners combines existing footnotes (b), (c), (d), (g) and (r). It is noted all nails and staples need to comply with ASTM F 1667, not just those for fiber-cement siding.
(4) Footnotes (i) and (j) are moved to the existing section on wood, hardboard and wood structural panel siding. Separate subsections are created for the requirements relevant to horizontal wood siding, vertical wood siding, and panel siding products. Minimum fastener size and minimum penetration requirements, along with other installation details, are coordinated with current installation guides such as those available from WRCLA or WWPA.
(5) The existing footnote (k) reference to the hardboard siding standard is moved to Section R703.5 (formerly Section R703.3).
(6) The existing footnote (l) reference to the vinyl siding standard is not needed as the standard is called out in Section R703.11. A pointer is added under the material listing.
(7) A new Section R703.3.3 is created dealing with fastener length and penetration. The penetration requirements from footnotes (m) and (o) for hardboard siding and footnotes (v), (y), and (z) are moved to items under this new section.
(8) The shank and head diameters in footnotes (m) and (o) for hardboard siding are moved into Table.R703.3.
(9) The fiber-cement section references from existing footnotes (q) and (s) are provided under the respective material listings. The shank diameter and length for the 6d common nail is provided. The "corrosion-resistant nail" language is removed since it is already required by the charging language for Table R703.3 (formerly Table R703.4).
(10) The "water-resistive barrier required" column is deleted. As of the 2012 IRC, all the products in Table R703.4 required a WRB unless covered by the exceptions under Section R703.2 for detached accessory buildings and for certain paper-backed stucco lath products. Since Section R703.2 always applies, existing footnote (u) is redundant.
(11) The existing footnote (w) reference to TMS 402 is relocated to the adhered veneer section.

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

R703.2-RB-EHRLICH.doc

Committee Action Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

R703.3 Nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings <u>attached to wood framing</u> shall be in accordance with Section R703.3.2. <u>Exterior wall coverings shall be attached to cold-formed steel light framing in accordance with the cladding manufacturer's installation instructions or an approved design.</u>

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding per ANSI/APA-PRP 210, fiber-cement panel siding, and fiber-cement lap siding installed over foam plastic sheathing shall penetrate a minimum of 1-1/2 inches into framing or shall be in accordance with the manufacturer's installation instructions.
2. Fasteners for hardboard panel and lap siding shall penetrate a minimum of 1-1/2 inches into framing.
3. Fasteners for vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. ~~Where approved by the manufacturer's instructions or test report,~~ vinyl siding shall be permitted to be installed with fasteners penetrating ~~not less than .75 inches~~ into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instructions or test report, with or without penetration into the framing. Where3 the fastener penetrates fully through the sheathing, the end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing. Fasteners for vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding installed over fiberboard or gypsum sheathing ~~or direct to studs~~ shall penetrate a minimum of 1-1/4 inches into framing.
4. Fasteners for vertical or horizontal wood siding shall penetrate a minimum of 1-1/2 inches into studs, studs and wood sheathing combined, or blocking.
5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined as specified above.

(Portions of proposal not shown remain unchanged)

Committee Reason: Approval was based upon the proponent's published reason. The modification addresses fastening to cold-formed steel framing and clarifies the fastener penetration for wood structural panels.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jay H. Crandell, d/b/a ARES Consulting, representing Steel Framing Alliance, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3 Nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.2. Exterior wall coverings shall be attached to cold-formed steel light ~~framing~~ frame construction in accordance with the cladding manufacturer's installation instructions, the requirements of Table R703.3 using screw fasteners substituted for the nails specified in accordance with Table R703.4, or an approved design.

TABLE R703.3(1)
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS
(portions of table not shown remain unchanged)

TABLE R703.3(2)
SCREW FASTENER SUBSTITUTION FOR SIDING ATTACHMENT TO COLD-FORMED STEEL LIGHT FRAME CONSTRUCTION[a,b,c,d,e]

Nail Diameter per Table R703.3	Minimum Screw Fastener Size
0.099"	#6
0.113"	#7
0.120"	#8

For SI: 1 inch = 25.4 mm

a. Screws shall comply with ASTM C1513 and shall penetrate a minimum of three threads through minimum 33 mil (20 gauge) cold-formed steel frame construction.
b. Screw head diameter shall not be less than the nail head diameter required by Table R703.3(1).

c. Number and spacing of screw fasteners shall comply with Table R703.3(1).
d. Pan head, hex washer head, modified truss head, or other screw head types with a flat attachment surface under the head shall be used for vinyl siding attachment.
e. Aluminum siding shall not be fastened directly to cold-formed steel light frame construction.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: At the committee action hearing, the committee realized the need to address siding connections to cold-formed steel framing. The code currently includes prescriptive fastening solutions for wood framing, but nothing for steel framing. This public comment builds on the committee's action and adds a simple prescriptive solution that makes use of and is based on equivalence to the nail fastening requirements already in the code.

Public Comment 2:

Matthew Dobson, Vinyl Siding Institute, Inc., requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3 Nominal thickness and attachments. The nominal thickness and attachment of exterior wall coverings shall be in accordance with Table R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings attached to wood framing shall be in accordance with Section R703.3.2 and Table 703.3. Exterior wall coverings shall be attached to cold-formed steel light framing in accordance with the cladding manufacturer's installation instructions or an approved design.

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

3. Fasteners for vinyl siding and insulated vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. Vinyl siding and insulated vinyl siding shall be permitted to be installed with fasteners penetrating not less than .75 inches into or through wood or wood structural sheathing of minimum thickness as specified by the manufacturer's instructions or test report, with or without penetration into the framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing. Fasteners for vinyl siding and insulated vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding and insulated vinyl siding installed over fiberboard or gypsum sheathing shall penetrate a minimum of 1-1/4 inches into framing.

(Portions of code change proposal not shown remain unchanged)

TABLE R703.3
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS (inches)	Joint Treatment	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
			Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Editorial Note: Insert after Hardboard lap siding in new table. Insulated Vinyl Siding (See Section R703.X)	0.035 (vinyl siding layer only)	Lap	0.120 nail (shank) with a 0.313 head or 16 gauge crown	0.120 nail (shank) with a 0.313 head or 16 gauge crown	0.120 nail (shank) with a 0.313 head or 16 gauge crown	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not Allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code.

Editorial Note: Insert after Particleboard panels in new table. Polypropylene Siding (See Section R703.X)	Not Applicable.	Lap	See section 703.13.1	See section 703.13.1	See section 703.13.1	See section 703.13.1	Not Allowed	As specified by the manufacturer instructions, test report or other sections of this code.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This change brings approved changes on installation from RB385 and RB387 into the new accepted formatting of RB392. The installation specifications were accepted but because of the changes in RB392 it is necessary to bring them along with this change.

Public Comment 3:

David Johnston, Vinyl Siding Institute, Inc., requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3.1 Wind limitations. Where ~~the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher,~~ the design wind pressure exceeds 30 psf, or where the limits of Table R703.3.1 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft^2.

TABLE R703.3.1
LIMITS FOR ATTACHMENT PER TABLE R703.3

Maximum Mean Roof Height

Ultimate Wind Speed (mph-3-second gust)	Exposure		
	B	C	D
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR
140	35'	DR	DR

NL = not limited by Table R703.3.1, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This public comment will merge the results of committee action on RB366 and RB367 into the committee action on RB392, and satisfy the intent of all proponents. The committee action on RB366 was to update the wind speed in the first sentence of the paragraph from the old 110 mph ASD basis to the new 140 mph Ultimate basis. This sentence states the maximum wind speed for which the attachment methods in Table 703.4 are applicable.
Committee action on RB367 was to delete this sentence but substitute similar criteria for the use of current Table R703.4 based on wind pressure rather than wind speed. The 30 psf threshold pressure matches the threshold for required design in ICC 600 and is slightly higher than the pressure that would result from either the previous 110 mph nominal (ASD) wind or a 140 mph (ultimate) wind in Exposure Category B with a mean roof height of 30 feet. RB367 also provides a table with maximum roof heights in different combinations of wind speed and exposure category that would produce 30 psf, so that use of the attachments table would also be limited to those roof heights.

Meanwhile, RB392 relocated section R703.4 and Table R703.4 to R703.3, and broke out a separate section R703.3.1 to state the wind limitation on the use of the table attachments. It makes sense to incorporate the changes made in RB366 and RB367 into this comprehensive proposal. This public comment thus would delete the sentence in R703.3.1 related to the wind *speed* limitation and substitute the wind *pressure* limitations, consistent with committee action on RB367. The roof height limitation table from RB367 would also be carried over and be designated Table R703.3.1.

The effect of all these changes would be to make the limitations of the attachment methods in Table R703.3 clearer and more complete, and consistent with ICC 600 and the other upgrades to the wind speed provisions being made to the IRC during this cycle.

Public Comment 4:

Edward L. Keith, representing APA – The Engineered Wood Association, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R703.3.2 Fasteners. Exterior wall coverings shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3 or with other *approved* corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F 1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16 gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into the studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions or in accordance with the Table R703.3.2.

Table R703.3.2
Optional Siding Attachment Schedule For Fasteners Where No Stud Penetration Necessary

APPLICATION	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS[b]
Exterior wall covering (weighing less than 11 psf) attachment to wood structural panel sheathing, either direct or over foam sheathing a maximum of 2 inches thick.[a] Note: Does not apply to vertical siding.	Ring shank roofing nail (0.120" min. dia.)	12" o.c.
	Ring shank nail (0.148" min. dia.)	15" o.c.
	#6 screw (0.138" min. dia.)	12" o.c.
	#8 screw (0.164" min. dia.)	16" o.c.

a. Fastener length shall be sufficient to penetrate back side of the wood structural panel sheathing by at least 1/4". The wood structural panel sheathing shall be 7/16" or thicker in thickness.

b. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: APA attempted to work with other industries while developing this code change proposal. There was, however, not sufficient time to fully resolve some of the outstanding issues with the Vinyl Siding Institute (VSI) in December 2012. This PC reflects the resolution between APA and the VSI. We also took this opportunity to make some adjustments to the original proposal that we were unable to make through the Floor Modification procedure.

The most compelling of the arguments received from the other industries was that this information would fit better in Chapter 7 and that the changes proposed and accepted as modified during the Committee Action Hearing to proposal RB392 provided the ideal location in Chapter 7. As such APA has submitted this Public Comment to RB392 and has submitted a similar Public Comment to RB277 where this proposal originally appeared. We will ask for RB277 to be heard after RB392 so that if we are successful with this public comment we will request denial for RB277.

Additional proposal adjustments – The below discusses the various modifications made to the table originally proposed for RB277.

1. The format of the able was changed slightly to account for the fact that the original proposal, RB277, was part of an existing table. In this Public Comment to RB392 the proposed is a free-standing table.
2. Recent research conducted by the foam industry suggests that limiting the thickness of the foam sheathing to 2 inches or less will minimize the potential for long term sagging of the siding material. With thicker foam sheathing the fasteners used to attach the foam are essentially cantilevered through the foam away from the main member of the connection. For smaller diameter fasteners the cantilevered fasteners can bend over time causing the water-resistant barrier to sag downward. Even though the use of the wall sheathing alone to anchor the siding requires a closer fastener spacing than that tested by the foam industry and should result in greater resistance to long term sagging of the siding, we have chosen to be conservative in our proposal to ensure good performance of the siding and its attachment to the wood structural panel sheathing.
3. We also changed the term "foam insulation" to "foam sheathing" to be consistent with the code definition.
4. Footnote "a" was rewritten separating the requirements of the footnote into two separate sentences to ensure correct interpretation of the provisions. The requirements are:
   a. Full penetration of the wood structural panel sheathing by at least ¼ inch to ensure that the pyramidal tip of the fastener is not considered in the "depth of penetration" of the fastener, as the tip contributes nothing to the withdrawal capacity of the fastener. We want the nail to penetrate the wood structural panel sheathing, *regardless of thickness* to provide a visual indication of the nails' presence, adequate length and penetration of the wood structural panel sheathing.
   b. The second separate requirement is the minimum thickness of the wood structural panel sheathing. The tables are based on the use of 7/16" minimum thickness sheathing.

5. The ring-shank roofing nail was added to the table as they have been used in part of the country.

RB392-13

Final Action: AS AM AMPC____ D

RB395-13
Table R602.3(1), R802.3.1, Figure 802.5.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a,b,c]	SPACING OF FASTENERS
Roof			
~~4~~	~~Collar tie to rafter, face nail or 1 ¼" x 20 gage ridge strap~~	~~3-10d (3" x 0.128")~~	~~-~~

(Portions of Table not shown remain unchanged)

Revise as follows:

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9)~~,~~ to provide a continuous tie across the building. ~~and the rafter~~ Rafters and ceiling joists shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or ~~securely~~ joined in accordance with Table R802.5.1(9). ~~where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to the rafters.~~ Laps or butts of ceiling joists shall be in accordance with Section R802.3.2.

~~Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the *attic* shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal), installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.~~

~~Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the *attic* space in accordance with Table R602.3(1).~~

~~Collar ties shall be a minimum of 1 inch by 4 inches (25 mm by 102 mm) (nominal), spaced not more than 4 feet (1219 mm) on center.~~

Where ceiling joists are connected to rafters above the top wall plate, they shall also meet the requirements for rafter ties. Where ceiling joists run perpendicular to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal) and be installed in accordance with Figure R802.5.1 and the connection requirements in Table R802.5.1(9).

Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.

Delete without substitution:

Delete references to "collar tie" in Figure R802.5.1

Reason: The current language is confusing to read. It contains unnecessary repetition.

In the first paragraph, the first and last sentences are combined. Language is inserted to address the connection of ceiling joists to the top plate. The word "securely" is being deleted as ceiling joists joined per the code are presumed to be secure. Laps or butts are already regulated in R802.3.2.

Specific direction on rafter ties has been editorially revised so it is more easily understood.

References to "collar ties" are being deleted because there is no place in the IRC that makes collars ties a requirement. The sentences says "Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space in accordance with Table R602.3(1)." The code says where they are to be connected, not when they are required. Something is missing. This text first appeared in the 2006 IRC but there isn't a valid explanation in ICC guides or manuals. Collar ties were not part of any previous I-Code. Why have rules for components that are not required? Such rules are unenforceable.

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

R802.3.1-RB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Based upon the proponent's request for disapproval. This would eliminate a design option without any technical justification.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a,b,c]	SPACING OF FASTENERS
	Roof		
4	Collar tie to rafter, face nail or 1 ¼" x 20 gage ridge strap	3-10d (3" x 0.128")	-

(Portions of Table not shown remain unchanged)

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9) to provide a continuous tie across the building. Rafters and ceiling joists shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or joined in accordance with Table R802.5.1(9). Laps or butts of ceiling joists shall be in accordance with Section R802.3.2.

Collar ties or ridge straps shall be installed in the upper third of the rafters in accordance with Table R602.3(1). Ridge straps shall be a minimum of 1 ¼" X 20 gage. Collar ties shall be a minimum of 1 inch by 4 inches (25 mm by 102 mm) (nominal) and spaced not more than 4 feet (1219 mm) on center.

Where ceiling joists are connected to rafters above the top wall plate, they shall also meet the requirements for rafter ties. Where ceiling joists run perpendicular to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal) and be installed in accordance with Figure R802.5.1 and the connection requirements in Table R802.5.1(9).

Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.

~~Delete references to "collar tie" in Figure R802.5.1~~

Commenter's Reason: The original proposal was requested to be denied to correct problems.

The current text in the IRC regarding ceiling joist and rafter connections is confusing to read.
The proposal intends to clarify the application of the code.
The modification revises the text for collar ties into mandatory language which is the intent. This had been omitted from the original submittal.

RB395-13
Final Action: AS AM AMPC____ D

RB396-13
R802.10.2.1, R802.11.1, Table R802.11

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not more than three stories above grade plane in height, and roof slopes not smaller than 3:12 (25 percent slope) or greater than 12:12 (100 percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 140 ~~110~~ miles per hour (63~~49~~ m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 p_g.

R802.11.1 Uplift resistance. Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1.2 and R802.11.1.3.

Where the uplift force does not exceed 200 pounds, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Where the basic wind speed does not exceed 115 mph ~~90 mph~~, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet (9754 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

~~TABLE R802.11~~
~~RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)~~~~[a, b, c, d, e, f, g, h]~~

~~RAFTER OR TRUSS SPACING~~	~~ROOF SPAN (feet)~~	~~EXPOSURE B~~							
		~~Basic Wind Speed (mph)~~							
		~~85~~		~~90~~		~~100~~		~~110~~	
		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~	
		~~< 5:12~~	~~≥ 5:12~~	~~< 5:12~~	~~≥ 5:12~~	~~< 5:12~~	~~≥ 5:12~~	~~< 5:12~~	~~≥ 5:12~~
~~12″ o.c.~~	~~12~~	~~47~~	~~41~~	~~62~~	~~54~~	~~93~~	~~81~~	~~127~~	~~110~~
	~~18~~	~~59~~	~~51~~	~~78~~	~~68~~	~~119~~	~~104~~	~~165~~	~~144~~
	~~24~~	~~70~~	~~61~~	~~93~~	~~81~~	~~145~~	~~126~~	~~202~~	~~176~~
	~~28~~	~~77~~	~~67~~	~~104~~	~~90~~	~~163~~	~~142~~	~~227~~	~~197~~
	~~32~~	~~85~~	~~74~~	~~115~~	~~100~~	~~180~~	~~157~~	~~252~~	~~219~~
	~~36~~	~~93~~	~~81~~	~~126~~	~~110~~	~~198~~	~~172~~	~~277~~	~~241~~
	~~42~~	~~105~~	~~91~~	~~143~~	~~124~~	~~225~~	~~196~~	~~315~~	~~274~~
	~~48~~	~~116~~	~~101~~	~~159~~	~~138~~	~~251~~	~~218~~	~~353~~	~~307~~

~~16″ o.c.~~	~~12~~	~~63~~	~~55~~	~~83~~	~~72~~	~~124~~	~~108~~	~~169~~	~~147~~
	~~18~~	~~78~~	~~68~~	~~103~~	~~90~~	~~159~~	~~138~~	~~219~~	~~191~~
	~~24~~	~~93~~	~~81~~	~~124~~	~~108~~	~~193~~	~~168~~	~~269~~	~~234~~
	~~28~~	~~102~~	~~89~~	~~138~~	~~120~~	~~217~~	~~189~~	~~302~~	~~263~~
	~~32~~	~~113~~	~~98~~	~~153~~	~~133~~	~~239~~	~~208~~	~~335~~	~~291~~
	~~36~~	~~124~~	~~108~~	~~168~~	~~146~~	~~264~~	~~230~~	~~369~~	~~321~~
	~~42~~	~~139~~	~~121~~	~~190~~	~~165~~	~~299~~	~~260~~	~~420~~	~~365~~
	~~48~~	~~155~~	~~135~~	~~212~~	~~184~~	~~335~~	~~291~~	~~471~~	~~410~~
~~24″ o.c.~~	~~12~~	~~94~~	~~82~~	~~124~~	~~108~~	~~186~~	~~162~~	~~254~~	~~221~~
	~~18~~	~~117~~	~~102~~	~~155~~	~~135~~	~~238~~	~~207~~	~~329~~	~~286~~
	~~24~~	~~140~~	~~122~~	~~186~~	~~162~~	~~290~~	~~252~~	~~404~~	~~351~~
	~~28~~	~~154~~	~~134~~	~~208~~	~~181~~	~~326~~	~~284~~	~~454~~	~~395~~
	~~32~~	~~170~~	~~148~~	~~230~~	~~200~~	~~360~~	~~313~~	~~504~~	~~438~~
	~~36~~	~~186~~	~~162~~	~~252~~	~~219~~	~~396~~	~~345~~	~~554~~	~~482~~
	~~42~~	~~209~~	~~182~~	~~285~~	~~248~~	~~449~~	~~391~~	~~630~~	~~548~~
	~~48~~	~~232~~	~~202~~	~~318~~	~~277~~	~~502~~	~~437~~	~~706~~	~~614~~
~~RAFTER OR TRUSS SPACING~~	**~~ROOF SPAN (feet)~~**	**~~EXPOSURE C~~**							
		~~Basic Wind Speed (mph)~~							
		~~85~~		**~~90~~**		**~~100~~**		**~~110~~**	
		~~Roof Pitch~~		**~~Roof Pitch~~**		**~~Roof Pitch~~**		**~~Roof Pitch~~**	
		~~< 5:12~~	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**
~~12″ o.c.~~	~~12~~	~~94~~	~~82~~	~~114~~	~~99~~	~~157~~	~~137~~	~~206~~	~~179~~
	~~18~~	~~120~~	~~104~~	~~146~~	~~127~~	~~204~~	~~177~~	~~268~~	~~233~~
	~~24~~	~~146~~	~~127~~	~~179~~	~~156~~	~~251~~	~~218~~	~~330~~	~~287~~
	~~28~~	~~164~~	~~143~~	~~201~~	~~175~~	~~283~~	~~246~~	~~372~~	~~324~~
	~~32~~	~~182~~	~~158~~	~~224~~	~~195~~	~~314~~	~~273~~	~~414~~	~~360~~
	~~36~~	~~200~~	~~174~~	~~246~~	~~214~~	~~346~~	~~301~~	~~456~~	~~397~~
	~~42~~	~~227~~	~~197~~	~~279~~	~~243~~	~~394~~	~~343~~	~~520~~	~~452~~
	~~48~~	~~254~~	~~221~~	~~313~~	~~272~~	~~441~~	~~384~~	~~583~~	~~507~~
~~RAFTER OR TRUSS SPACING~~	**~~ROOF SPAN (feet)~~**	**~~EXPOSURE C~~**							
		~~Basic Wind Speed (mph)~~							
		~~85~~		**~~90~~**		**~~100~~**		**~~110~~**	
		~~Roof Pitch~~		**~~Roof Pitch~~**		**~~Roof Pitch~~**		**~~Roof Pitch~~**	
		~~< 5:12~~	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**	**~~< 5:12~~**	**~~≥ 5:12~~**

~~16″ o.c.~~	~~12~~	~~125~~	~~109~~	~~152~~	~~132~~	~~209~~	~~182~~	~~274~~	~~238~~
	~~18~~	~~160~~	~~139~~	~~194~~	~~169~~	~~271~~	~~236~~	~~356~~	~~310~~
	~~24~~	~~194~~	~~169~~	~~238~~	~~207~~	~~334~~	~~291~~	~~439~~	~~382~~
	~~28~~	~~218~~	~~190~~	~~267~~	~~232~~	~~376~~	~~327~~	~~495~~	~~431~~
	~~32~~	~~242~~	~~211~~	~~298~~	~~259~~	~~418~~	~~364~~	~~551~~	~~479~~
	~~36~~	~~266~~	~~231~~	~~327~~	~~284~~	~~460~~	~~400~~	~~606~~	~~527~~
	~~42~~	~~302~~	~~263~~	~~372~~	~~324~~	~~524~~	~~456~~	~~691~~	~~601~~
	~~48~~	~~338~~	~~294~~	~~416~~	~~362~~	~~587~~	~~511~~	~~775~~	~~674~~
~~24″ o.c.~~	~~12~~	~~188~~	~~164~~	~~228~~	~~198~~	~~314~~	~~273~~	~~412~~	~~358~~
	~~18~~	~~240~~	~~209~~	~~292~~	~~254~~	~~408~~	~~355~~	~~536~~	~~466~~
	~~24~~	~~292~~	~~254~~	~~358~~	~~311~~	~~502~~	~~437~~	~~660~~	~~574~~
	~~28~~	~~328~~	~~285~~	~~402~~	~~350~~	~~566~~	~~492~~	~~744~~	~~647~~
	~~32~~	~~364~~	~~317~~	~~448~~	~~390~~	~~628~~	~~546~~	~~828~~	~~720~~
	~~36~~	~~400~~	~~348~~	~~492~~	~~428~~	~~692~~	~~602~~	~~912~~	~~793~~
	~~42~~	~~454~~	~~395~~	~~558~~	~~485~~	~~786~~	~~684~~	~~1040~~	~~905~~
	~~48~~	~~508~~	~~442~~	~~626~~	~~545~~	~~882~~	~~767~~	~~1166~~	~~1014~~

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 0.454 kg, 1 pound per linear foot = 14.5 N/m.~~

a. ~~The uplift connection forces are based on a maximum 33-foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated basic wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.~~

b. ~~The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.~~

c. ~~The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.~~

d. ~~The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.~~

e. ~~For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.~~

f. ~~For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.~~

g. ~~Linear interpolation between tabulated roof spans and wind speeds shall be permitted.~~

h. ~~The tabulated forces for a 12-inch on-center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.~~

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION) [a, b, c, d, e, f, g, h]

RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE B**									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		**115**		**120**		**130**		**140**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		<5:12	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**
12" o.c.	12	48	32	59	42	70	52	95	73	122	97
	18	59	42	74	55	89	69	122	98	157	129
	24	71	52	89	69	108	86	149	123	192	162
	28	79	59	99	78	121	97	167	139	216	184
	32	86	66	109	87	134	109	185	156	240	206

	36	94	72	120	96	146	120	203	172	264	229
	42	106	83	135	109	166	138	230	197	300	262
	48	118	93	151	123	185	155	258	222	336	295
16" o.c.	12	64	43	78	56	93	69	126	97	162	129
	18	78	56	98	73	118	92	162	130	209	172
	24	94	69	118	92	144	114	198	164	255	215
	28	105	78	132	104	161	129	222	185	287	245
	32	114	88	145	116	178	145	246	207	319	274
	36	125	96	160	128	194	160	270	229	351	305
	42	141	110	180	145	221	184	306	262	399	348
	48	157	124	201	164	246	206	343	295	447	392
24" o.c.	12	96	64	118	84	140	104	190	146	244	194
	18	118	84	148	110	178	138	244	196	314	258
	24	142	104	178	138	216	172	298	246	384	324
	28	158	118	198	156	242	194	334	278	432	368
	32	172	132	218	174	268	218	370	312	480	412
	36	188	144	240	192	292	240	406	344	528	458
	42	212	166	270	218	332	276	460	394	600	524
	48	236	186	302	246	370	310	516	444	672	590
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		**115**		**120**		**130**		**140**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		<5:12	**≥5:12**	**<5:12**	**<5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**
12" o.c.	12	95	73	110	86	126	100	161	130	198	163
	18	121	97	141	115	163	135	208	175	257	219
	24	148	122	173	145	200	169	256	220	317	275
	28	166	138	195	164	225	192	289	250	358	313
	32	184	155	216	184	249	215	321	280	398	351
	36	202	171	237	204	274	238	353	310	438	389
	42	229	196	269	233	312	273	402	356	499	446
	48	256	221	302	263	349	307	450	401	560	503
16" o.c.	12	126	97	146	114	168	133	214	173	263	217
	18	161	129	188	153	217	180	277	233	342	291
	24	197	162	230	193	266	225	340	293	422	366
	28	221	184	259	218	299	255	384	333	476	416
	32	245	206	287	245	331	286	427	372	529	467
	36	269	227	315	271	364	317	469	412	583	517
	42	305	261	358	310	415	363	535	473	664	593
	48	340	294	402	350	464	408	599	533	745	669
24" o.c.	12	190	146	220	172	252	200	322	260	396	326
	18	242	194	282	230	326	270	416	350	514	438
	24	296	244	346	290	400	338	512	440	634	550
	28	332	276	390	328	450	384	578	500	716	626
	32	368	310	432	368	498	430	642	560	796	702
	36	404	342	474	408	548	476	706	620	876	778
	42	458	392	538	466	624	546	804	712	998	892
	48	512	442	604	526	698	614	900	802	1120	1006

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.

a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.
b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.
c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.
d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.
e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.
f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
h. The tabulated forces for a 12” on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates Chapter 8, including wood truss applicability limits and roof uplift connection provisions. It is noted that the changes necessary to update the appropriate Section R804 cold-formed steel provisions are contained in a separate AISI proposal which comprehensively revises the cold-formed steel provisions.

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

RB396-13

R802.10.2.1-RB-EHRLICH.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)[a, b, c, d, e, f, g, h]

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B							
		Nominal Design Windspeed V_{ASD} (mph)							
		85		90		100		110	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥5:12	< 5:12	≥5:12	< 5:12	≥5:12	≥5:12	≥5:12
12” o.c.	12	47	41	62	54	93	81	127	110
	18	59	51	78	68	119	104	165	144
	24	70	61	93	81	145	126	202	176
	28	77	67	104	90	163	142	227	197
	32	85	74	115	100	180	157	252	219
	36	93	81	126	110	198	172	277	241
	42	105	91	143	124	225	196	315	274
	48	116	101	159	138	251	218	353	307

16" o.c.	12	63	55	83	72	124	108	169	147
	18	78	68	103	90	159	138	219	191
	24	93	81	124	108	193	168	269	234
	28	102	89	138	120	217	189	302	263
	32	113	98	153	133	239	208	335	291
	36	124	108	168	146	264	230	369	321
	42	139	121	190	165	299	260	420	365
	48	155	135	212	184	335	291	471	410
24" o.c.	12	94	82	124	108	186	162	254	221
	18	117	102	155	135	238	207	329	286
	24	140	122	186	162	290	252	404	351
	28	154	134	208	181	326	284	454	395
	32	170	148	230	200	360	313	504	438
	36	186	162	252	219	396	345	554	482
	42	209	182	285	248	449	391	630	548
	48	232	202	318	277	502	437	706	614
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**							
		Nominal Design Windspeed V_{ASD} (mph)							
		85		**90**		**100**		**110**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		< 5:12	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**
12" o.c.	12	94	82	114	99	157	137	206	179
	18	120	104	146	127	204	177	268	233
	24	146	127	179	156	251	218	330	287
	28	164	143	201	175	283	246	372	324
	32	182	158	224	195	314	273	414	360
	36	200	174	246	214	346	301	456	397
	42	227	197	279	243	394	343	520	452
	48	254	221	313	272	441	384	583	507
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**							
		Nominal Design Windspeed V_{ASD} (mph)							
		85		**90**		**100**		**110**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		< 5:12	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**	**< 5:12**	**≥5:12**

16” o.c.	12	125	109	152	132	209	182	274	238
	18	160	139	194	169	271	236	356	310
	24	194	169	238	207	334	291	439	382
	28	218	190	267	232	376	327	495	431
	32	242	211	298	259	418	364	551	479
	36	266	231	327	284	460	400	606	527
	42	302	263	372	324	524	456	691	601
	48	338	294	416	362	587	511	775	674
24” o.c.	12	188	164	228	198	314	273	412	358
	18	240	209	292	254	408	355	536	466
	24	292	254	358	311	502	437	660	574
	28	328	285	402	350	566	492	744	647
	32	364	317	448	390	628	546	828	720
	36	400	348	492	428	692	602	912	793
	42	454	395	558	485	786	684	1040	905
	48	508	442	626	545	882	767	1166	1014

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 0.454 kg, 1 pound per linear foot = 14.5 N/m.

a. The uplift connection forces are based on a maximum 33-foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated basic wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.

b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.

c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.

d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.

e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.

f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.

g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.

h. The tabulated forces for a 12-inch on-center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

~~TABLE R802.11~~

~~RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION)~~ ~~[a, b, c, d, e, f, g, h]~~

~~RAFTER OR TRUSS SPACING~~	~~ROOF SPAN (feet)~~	~~EXPOSURE B~~									
		~~Ultimate Design Wind Speed, V_{ULT} (mph)~~									
		~~110~~		~~115~~		~~120~~		~~130~~		~~140~~	
		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~		~~Roof Pitch~~	
		~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~	~~<5:12~~	~~≥5:12~~
~~12" o.c.~~	~~12~~	~~48~~	~~32~~	~~59~~	~~42~~	~~70~~	~~52~~	~~95~~	~~73~~	~~122~~	~~97~~
	~~18~~	~~59~~	~~42~~	~~74~~	~~55~~	~~89~~	~~69~~	~~122~~	~~98~~	~~157~~	~~129~~
	~~24~~	~~71~~	~~52~~	~~89~~	~~69~~	~~108~~	~~86~~	~~149~~	~~123~~	~~192~~	~~162~~
	~~28~~	~~79~~	~~59~~	~~99~~	~~78~~	~~121~~	~~97~~	~~167~~	~~139~~	~~216~~	~~184~~

	32	86	66	109	87	134	109	185	156	240	206
	36	94	72	120	96	146	120	203	172	264	229
	42	106	83	135	109	166	138	230	197	300	262
	48	118	93	151	123	185	155	258	222	336	295
16" o.c.	12	64	43	78	56	93	69	126	97	162	129
	18	78	56	98	73	118	92	162	130	209	172
	24	94	69	118	92	144	114	198	164	255	215
	28	105	78	132	104	161	129	222	185	287	245
	32	114	88	145	116	178	145	246	207	319	274
	36	125	96	160	128	194	160	270	229	351	305
	42	141	110	180	145	221	184	306	262	399	348
	48	157	124	201	164	246	206	343	295	447	392
24" o.c.	12	96	64	118	84	140	104	190	146	244	194
	18	118	84	148	110	178	138	244	196	314	258
	24	142	104	178	138	216	172	298	246	384	324
	28	158	118	198	156	242	194	334	278	432	368
	32	172	132	218	174	268	218	370	312	480	412
	36	188	144	240	192	292	240	406	344	528	458
	42	212	166	270	218	332	276	460	394	600	524
	48	236	186	302	246	370	310	516	444	672	590

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		<5:12	≥5:12	<5:12	<5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12
12" o.c.	12	95	73	110	86	126	100	161	130	198	163
	18	121	97	141	115	163	135	208	175	257	219
	24	148	122	173	145	200	169	256	220	317	275
	28	166	138	195	164	225	192	289	250	358	313
	32	184	155	216	184	249	215	321	280	398	351
	36	202	171	237	204	274	238	353	310	438	389
	42	229	196	269	233	312	273	402	356	499	446
	48	256	221	302	263	349	307	450	401	560	503
16" o.c.	12	126	97	146	114	168	133	214	173	263	217
	18	161	129	188	153	217	180	277	233	342	291
	24	197	162	230	193	266	225	340	293	422	366
	28	221	184	259	218	299	255	384	333	476	416
	32	245	206	287	245	331	286	427	372	529	467
	36	269	227	315	271	364	317	469	412	583	517
	42	305	261	358	310	415	363	535	473	664	593
	48	340	294	402	350	464	408	599	533	745	669
24" o.c.	12	190	146	220	172	252	200	322	260	396	326
	18	242	194	282	230	326	270	416	350	514	438
	24	296	244	346	290	400	338	512	440	634	550
	28	332	276	390	328	450	384	578	500	716	626
	32	368	310	432	368	498	430	642	560	796	702
	36	404	342	474	408	548	476	706	620	876	778
	42	458	392	538	466	624	546	804	712	998	892

	~~48~~	~~512~~	~~442~~	~~604~~	~~526~~	~~698~~	~~614~~	~~900~~	~~802~~	~~1120~~	~~1006~~

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.~~

~~a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.~~

~~b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.~~

~~c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.~~

~~d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.~~

~~e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.~~

~~f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.~~

~~g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.~~

~~h. The tabulated forces for a 12" on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.~~

Committee Reason: This change provides the basis for calculating the appropriate wind load in accordance with ASCE 7-10. The modification deletes the proposed revised table and restores the original table in order to allow to bring back as a corrected table.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**TABLE R802.11**~~
~~**RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)**~~ ~~[a, b, c, d, e, f, g, h]~~

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION) [a, b, c, d, e, f, g, h]

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12
12" o.c.	12	48	43	59	53	70	64	95	88	122	113
	18	59	52	74	66	89	81	122	112	157	146
	24	71	62	89	79	108	98	149	137	192	178
	28	79	69	99	88	121	109	167	153	216	200
	32	86	75	109	97	134	120	185	170	240	222
	36	94	82	120	106	146	132	203	186	264	244
	42	106	92	135	120	166	149	230	211	300	278
	48	118	102	151	134	185	166	258	236	336	311
16" o.c.	12	64	57	78	70	93	85	126	117	162	150
	18	78	69	98	88	118	108	162	149	209	194
	24	94	82	118	105	144	130	198	182	255	237
	28	105	92	132	117	161	145	222	203	287	266
	32	114	100	145	129	178	160	246	226	319	295

	36	125	109	160	141	194	176	270	247	351	325
	42	141	122	180	160	221	198	306	281	399	370
	48	157	136	201	178	246	221	343	314	447	414
24" o.c.	12	96	86	118	106	140	128	190	176	244	226
	18	118	104	148	132	178	162	244	224	314	292
	24	142	124	178	158	216	196	298	274	384	356
	28	158	138	198	176	242	218	334	306	432	400
	32	172	150	218	194	268	240	370	340	480	444
	36	188	164	240	212	292	264	406	372	528	488
	42	212	184	270	240	332	298	460	422	600	556
	48	236	204	302	268	370	332	516	472	672	622
RAFTER OR TRUSS SPACING	**ROOF SPAN (feet)**	**EXPOSURE C**									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		**115**		**120**		**130**		**140**	
		Roof Pitch		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**		**Roof Pitch**	
		<5:12	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**	**<5:12**	**≥5:12**
12" o.c.	12	95	88	110	102	126	118	161	151	198	186
	18	121	111	141	131	163	151	208	195	257	242
	24	148	136	173	160	200	185	256	239	317	298
	28	166	152	195	179	225	208	289	269	358	335
	32	184	168	216	199	249	231	321	299	398	373
	36	202	185	237	219	274	254	353	329	438	411
	42	229	210	269	248	312	289	402	375	499	468
	48	256	234	302	278	349	323	450	420	560	524
16" o.c.	12	126	117	146	136	168	157	214	201	263	247
	18	161	148	188	174	217	201	277	259	342	322
	24	197	181	230	213	266	246	340	318	422	396
	28	221	202	259	238	299	277	384	358	476	446
	32	245	223	287	265	331	307	427	398	529	496
	36	269	246	315	291	364	338	469	438	583	547
	42	305	279	358	330	415	384	535	499	664	622
	48	340	311	402	370	464	430	599	559	745	697
24" o.c.	12	190	176	220	204	252	236	322	302	396	372
	18	242	222	282	262	326	302	416	390	514	484
	24	296	272	346	320	400	370	512	478	634	596
	28	332	304	390	358	450	416	578	538	716	670
	32	368	336	432	398	498	462	642	598	796	746
	36	404	370	474	438	548	508	706	658	876	822
	42	458	420	538	496	624	578	804	750	998	936
	48	512	468	604	556	698	646	900	840	1120	1048

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.

a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.

b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.

c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.

d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.

e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.

f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
h. The tabulated forces for a 12" on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The purpose of this public comment is to complete the updating of the IRC Chapter 8 provisions to correlate with the ultimate wind speed basis of the 2012 IBC and ASCE 7-10. A review of the new roof uplift load table by AWC shortly before the Committee Action Hearings uncovered an error in the calculations for 5:12 roof slopes and greater. (The values for roof slopes less than 5:12 were correct.) Since there was not time to track down the error and prepare an amended table in time for the hearings, and we did not want to ask for disapproval given the remaining portions of the wind update heard up to that point had passed, we opted to maintain the original table but identify the wind speeds as "nominal design wind speeds" using the V_{ASD} term introduced in the 2012 IBC.

The error in the calculations has now been identified and corrected and a new version of Table R802.11 generated using ultimate design wind speeds. This public comment supplies the new table and values to replace the existing V_{ASD} table and complete the updating of the IRC wind provisions. It is noted the values proposed here have been checked against AWC's calculations and confirmed.

RB396-13

Final Action: AS AM AMPC____ D

RB397-13
R802.11.1.2

Proposed Change as Submitted

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings <u>for the basic wind speed as determined by Figure R301.2(4)A and listed in Table R301.2(1).</u> Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Reason: The purpose of this code change is to clarify the requirements for determining uplift loads for trusses. The proposal adds a pointer to the Climatic and Geographic Design Criteria table and the Basic Wind Speed figure. This emphasizes the need for the Truss Designer to correctly select the proper wind speed and other criteria for the site and building in the truss design software and not just pick the highest wind speed applicable in a state or the highest mean roof height permitted. It is critical the Truss Design Drawings reflect the correct uplift reactions for the site and building in question and not a more conservative reaction. Otherwise, the builder (and homeowner) would be required to install extra (or larger) uplift connectors than would normally be necessary for the loads anticipated at the site.

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

RB397-13

R802.11.1.2-RB-EHRLICH.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings for the ~~basic~~ <u>ultimate design</u> wind speed as determined by Figure R301.2(4) and listed in Table R301.2(1). Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Commenter's Reason: The purpose of this public comment is to correlate the original proposal with the update of the IRC wind provisions to the ultimate wind speed basis of the 2012 IBC and ASCE 7-10. The term "basic wind speed" is amended to "ultimate design wind speed" in keeping with the set of approved code changes which comprehensively implement the new wind provisions.

Public Comment 2:

Larry Wainright, Qualtim, representing Structural Building Components Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings for the basic wind speed as determined by Figure R301.2(4)A and listed in Table R301.2(1) or as shown on the construction documents. Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Commenter's Reason: While SBCA agrees in concept that that trusses should be designed at a minimum to the wind speeds determined by Figure R301.2(4) and listed in Table R301.2(1), truss designers are not building designers. In accordance with ANSI/TPI 1, chapter 2 (the truss design standard referenced by the IRC) truss designers must design the trusses in accordance with the construction documents provided. It is the prerogative of the building designer to specify design parameters above the minimum code requirements. As written, the code would not allow the truss designer to do truss design in accordance with the building designer's specification if it is greater than the minimum requirements.

RB397-13
Final Action: AS AM AMPC____ D

RB401-13
R806.1

Proposed Change as Submitted

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

R806.1 Ventilation required. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum.
Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

> ~~**Exception:** Attic ventilation shall not be required when determined not necessary by the code official due to atmospheric or climatic conditions.~~

Reason: With recent revisions to the IRC roof ventilation requirements, and an IBC change approved last year, both codes now contain specific details on both vented and unvented attics with detailed requirements related to the use of vapor retarders and climate specific instructions on the use of air-impermeable insulation. Now that the IRC contains these provisions, the current exception creates a conflict and an unnecessary alternative. Additionally, since the exception is based on climatic conditions, with no direction to the code official on matters related to construction methods or details, it cannot be applied on a project-by-project basis.

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

RB401-13

R806.1-RB-FISCHER.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Disapproved

Commenter's Reason: The purpose of this public comment is to restore the language permitting the building official to waive attic ventilation requirements. With the increasing complexity of today's houses, building tightness requirements, and energy efficiency requirements, the proper construction of enclosed attic and rafter spaces is critical. The code needs to give building officials clear flexibility to work with builders in cases where local climate conditions (microclimates), complex roof shapes, or other challenges (e.g. PV systems taking up a large area of the roof) make complying either with traditional ventilation requirements for enclosed attic and rafter spaces or the unvented roof provisions of the IRC difficult. Restoring this provision will provide building officials with the discretion to accommodate these unusual cases.

Examples of conditions where this exception is used include occupied roof decks, low slope (flat) roofs or vaulted ceilings using rafters with drywall attached to directly to the underside of the solid combination rafter-ceiling joist. In many cases it is not possible to provide the 3 ft elevation difference between the high and low vents on low slope roofs and where low slope roofs include parapets and therefore no eave vents. These types of roof assemblies are particularly popular in the hot, dry, desert climates of the Southwest. Building officials in that region have been allowing exemptions to ventilated roof assemblies (without requiring the type of unvented roof required by the IRC) going back to when the UBC was in force. In fact, it was a building official from San Diego who reintroduced the current exception to the code, based on the good performance of unvented roof assemblies in that region.

Another example of a condition where flexibility is needed is in wildland-urban regions. In areas at higher risk of wildfires and/or where water supplies for firefighting are insufficient, the IWUIC imposes stringent requirements on construction. Eaves and soffits must be constructed of ignition-resistant materials or materials providing a 1-hour fire rating. Eave and soffit vents prohibited, and other vents are limited to a total area of 144 square inches. These requirements could have the effect of leaving builders in these areas with little choice but to construct an unvented rafter or roof assembly, even if such an assembly is not recommended for their particular climate. The exception will provide builders and building officials flexibility to deal with these areas.

It is noted a similar code change deleting this exception for the 2015 IBC was disapproved by the IBC-FS Committee and the final assembly in Portland.

RB401-13

Final Action: AS AM AMPC____ D

RB402-13
R806.1, R806.2, R806.3, R806.4, R806.5

Proposed Change as Submitted

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

Revise as follows:

SECTION R806
ROOF VENTILATION

~~**R806.1 Ventilation required.** Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.~~

> ~~**Exception:** Attic ventilation shall not be required when determined not necessary by the code official due to atmospheric or climatic conditions.~~

~~**R806.2 Minimum vent area.** The minimum net free ventilating area shall be 1/150 of the area of the vented space.~~

> ~~**Exception:** The minimum net free ventilation area shall be 1/300 of the vented space provided one or more of the following conditions are met:~~
>
> 1. ~~In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.~~
> 2. ~~At least 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located no more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.~~

<u>**R806.1 Ventilation.** The requirements for vented and unvented attic space and enclosed rafter space shall be in accordance with this section.</u>

<u>**R806.2 Vented attics.** Vented attics shall have a minimum net free ventilation area at least 1/300 of the area of the vented space. Between half and two thirds of the provided ventilation shall be installed at the eaves. The ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.</u>

~~**R806.3 Vent and insulation clearance.**~~ Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

~~**R806.4**~~ **R806.2.1 Installation and weather protection.** Ventilators shall be installed in accordance with manufacturer's installation instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1.

~~**R806.5**~~ **R806.3 Unvented attic and unvented enclosed rafter assemblies**. Unvented *attic* assemblies (spaces between the ceiling joists of the top *story* and the roof rafters) and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:

1. The unvented *attic* space is completely contained within the *building thermal envelope.*
2. No interior Class I vapor retarders are installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed rafter assembly.
3. Where wood shingles or shakes are used, a minimum $^{1}/_{4}$-inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder, or shall have a Class III vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Either Items 5.1, 5.2 or 5.3 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
   - 5.1. *Air-impermeable insulation* only. Insulation shall be applied in direct contact with the underside of the structural roof sheathing.
   - 5.2. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.5 for condensation control.
   - 5.3. Air-impermeable and air-permeable insulation. The *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing as specified in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the *air-impermeable insulation.*
   - 5.4. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

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

1. This section was rewritten to clarify vented and unvented attics. The current charging language in the first sentence of Section R806.1 says that all attics shall have cross ventilation, and yet Section R806.5 acknowledges unvented attics. The new Section R806.1 offers charging language for both conditions.
2. More importantly however, Section 806.2 now incorporates the concepts that were passed in Portland for the IBC, namely that more than half of the incoming ventilation for attics should come from low sources (eaves) and exit up high (roof vent, mechanical vents, gable end vents, etc.). A range is provided: ½ to 2/3 should be low at the eaves for proper chimney effect. Currently the code would allow 100% of the attic ventilation to be from ridge vents…where would the cross ventilation come from?

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

RB402-13

R806.1-RB-BAJNAI-BCAC.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This change would eliminate some venting configurations, such as gable end vents that have proved reliable for years. Also, there are some situations where eave vents cannot be installed. The committee likes the proposed reorganization and the proponent should rework and bring back.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R806.2 Vented attics. Vented attics shall have a minimum net free ventilation area at least 1/300 of the area of the vented space. ~~Between half and two thirds of the provided ventilation shall be installed at the eaves.~~ A minimum of 50 percent and a maximum of 60 percent of the provided ventilation shall be served by eave, gable or cornice vents. The remaining ventilation shall be located no more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically. The ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: The ICC Building Code Action Committee (BCAC) is submitting this public comment to address the code development committees concerns.

1. Working with opponents, the BCAC further reduced the amount of ventilation area required at the eaves to a maximum of 60% of the total required ventilation area;
2. added optional methods of venting at the lowest portions of attics: gable and cornice vents; and
3. clarified where the upper ventilation shall be measured from: 3' *measured vertically*.

RB402-13

Final Action: AS AM AMPC____ D

RB406-13
R807.1

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

R807.1 Attic Access. ~~Buildings~~ Dwellings with concealed ~~combustible ceilings or roof construction~~ attics shall have an attic access opening to attic areas that ~~exceed 30 square feet and~~ have a vertical height of 30 inches or more. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) ~~and shall be located in a hallway or other readily accessible location~~. When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics.*

Exception: An attic access is not required:

1. for attics above unconditioned space or
2. where the area of the attic is less than 300 square feet

Reason: The ICC Commentary for the IRC states: *The requirement for an attic access is predicated on the likelihood that during the life of the structure, access to an attic space for repair of piping, electrical and mechanical systems will be required.*

If this is true, then language in the section that states *"Buildings with combustible ceilings or roof construction shall have…."* is misleading because attics of non-combustible construction are just as likely to have piping, electrical and mechanical systems. The ***IBC*** makes no mention of combustibility in its attic access requirements. And, the mechanical code (M1305.1.3) already requires access for equipment in an attic. It is less obvious why access is need for piping or electrical systems that would never need service. So the purpose of the access is universally poorly understood.

If it is believed that access should be provided regardless of equipment, a more realistic approach would be to require access to any attic that contains concealed spaces and without regard to construction materials used. Furthermore, direction on the location of the access needs to be more useful. Currently the code says the access must be "in a hallway or other readily accessible location". There are a number of problems with this language. It leads one to believe that the access must be interior to the dwelling. Why couldn't the access be via a gable end hatch, through a knee wall, or via a garage attic? Eliminating the access within the dwelling solves a problem involving heat loss and air infiltration.

Another confusing component is that the term "readily accessible" is somewhat defined in the code as follows:

> *Ready Access (to). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door, or similar obstruction, and without requiring the use of portable access equipment.*

This poses another dilemma. It states that "ready access" may not require removal of a panel or movement of a door and must be accessed by means other than a portable device such as a ladder. So interpreted literally would mean that the access could not be in a room accessed by a door, swinging or sliding, and it must be accessed by means of a stair or fixed ladder. This is not the norm practiced in the industry.

Then there is the issue of providing access to spaces as small as 30 square feet which means even some small porch attics would require access. 30 square feet is just too small an area to regulate.

The IBC provides no direction on where the access must be. It only requires that there be one and stipulates the size.
To alleviate these issues, this proposal would require an access for all attics in dwellings that have concealed spaces, would not dictate where the access must be consistent with the IBC, and provides two exceptions where access would typically serve no useful purpose such as a garage attic or areas with very small attics.

It should also be remembered that an access can be provided even if the code does not require one and that creating an opening in a ceiling or wall that does not contain an opening is a very simple operation.

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

R807.1-RB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels the 30 square feet criteria should be retained and prefers RB407-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R807.1 Attic Access. Buildings ~~Dwellings~~ with concealed attics shall have an attic access opening to attic areas that exceed 30 square feet and have a vertical height of 30 inches or more. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm). When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics.*

~~**Exception:** An attic access is not required:~~

~~1. for attics above unconditioned space or~~
~~2. where the area of the attic is less than 300 square feet~~

Commenter's Reason: In denying this proposal, the committee objected to the deletion of the 30 square foot trigger for access. This modification reinserts that phrase. The committee also expressed concern about the deletion of attic access created by the exceptions so the modification deletes the exceptions. The committee also expressed concern that attic access would only apply to dwellings so the term "buildings" has been reinserted in the first sentence.

The committee did agree on two points. First, they agreed that access to an attic should be provided whether or not the roof construction was combustible because of the potential for mechanical equipment to be serviced and for other inspection or maintenance purposes so the modification retains that revision. The committee also agreed that the access requirements should be consistent with the IBC so the location requirement is retained.

RB406-13

Final Action: AS AM AMPC____ D

RB425-13
R905.2.7.1

Proposed Change as Submitted

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exceptions:

1. Detached *accessory structures* that contain no *conditioned floor area*.
2. Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.

Reason: In steep slope applications in climates where ice forms at the eave edge of roofs, ice melts due to heat from below, then freezes where the water meets roof surfaces that are over unheated areas, making a buildup of ice. This buildup becomes a 'dam' that backs water up under the roof covering and underlayment leaking into the building.

The purpose of this proposal is to bring the Code into alignment with the practical application of the ice barrier underlayment products in the field. Since gravity stops water from backing up very far on super steep slopes greater than 8" in 12" there needs to be a limit to the amount of ice barrier underlayment applied.

On very steep sloped roofs, the ice dams will still occur. However, buildup of ice cannot build far beyond the ball that forms at the gutter edge on slopes greater than 8" in 12" due to the slope. Secondly, the water will not defy gravity and move very far upward, when the physics of the application are that the water will drip over the dam first.

For very high sloped roofs where the vertical surface never intersects the heated wall, complete coverage of underlayment is needed. In short, the way the current code is written, ice barrier material may be needed on the complete 'high sloped' roof deck rather than protect just the eave edges and 3' up slope. The intent of 3' of underlayment applied past the warm vertical wall intersection up slope is met with this change.

Through clarifying this requirement with the second exception, the intent of the code is met while not burdening the building official with a variance request on a very small cost item.

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

RB425-13

R905.2.7.1 #1-RB-MCHUGH.doc

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building. Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.

Exceptions:

~~1.~~ Detached *accessory structures* that contain no *conditioned floor area*.

2. ~~Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.~~

Committee Reason: Approval was based upon the proponent's published reason. The modification adds clarity by moving the exception into the body of the text.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB), requests Approved as Modified by this Public Comment.

Further modify the proposal as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building~~. Roofs~~ <u>On roofs</u> with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall <u>also</u> be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.

Exception: Detached *accessory structures* that contain no *conditioned floor area*.

Commenter's Reason: The purpose of this public comment is to further amend RB425 as it was modified at the IRC Building hearings. The approved floor modification is an improvement to the original proposal, however it still leaves a potential issue with the application of ice barriers. The critical dimension for applying ice barriers to reduce the risk of ice dams is the 24" horizontal measurement inward from the exterior wall line of the building. This applies regardless of the length of the overhang. The language approved in Dallas has the potential to result in the ice barrier not extending inward 24" horizontally from the exterior wall line if a steep overhang is sufficiently long, thus increasing the risk of ice dams. This public comment makes a further modification to insure that both requirements apply and the proper length of ice barrier is provided.

RB425-13

Final Action: AS AM AMPC____ D

RB426-13
R905.2.7.1

Proposed Change as Submitted

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend <u>2 inches (51 mm) down the fascia and under the drip edge and</u> from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Reason: In steep slope applications in climates where ice forms at the eave edge of roofs, ice melts due to heat from below, then freezes where the water meets roof surfaces that are over unheated areas. The frozen water builds, resulting in a dam that blocks water flow of water that continues to flow due to heat. That 'dam' blocks water flow causing water to stand on the roof, even when it has slope. The result is that the 'dam' buildup forces water upslope under roof covering causing leaks.

Studies show that roof recover applications typically fail at flashings on all roof slopes. The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing water back up the slope of the structure.

According to CRCA roofing contractors, if the code required underlayment is applied to the top of the metal drip edge, a seal may be difficult and the water will leak into the structure where a void exists. Voids form due to joints in the metal, uneven or dirty surfaces before application of the underlayment. Further, if underlayment is applied to these flashings, water can be pushed by the ice dam working on the 'back water lap' up slope possibly causing leaks. The leak(s) may be difficult to detect in the concealed space location.

In new construction, tear off and roof replacement situations, the roofing underlayment is easily installed before the drip edges at the eave edge. In reroofing and roof-recover applications, it does mean removing edge metal and reapplication.

We believe this will provide needed guidance to both new construction, reroofing, roof recover and roof replacements providing better service to the residential building owner.

Cost Impact: This may slightly increase cost of reroofing, roof recover. There is a very small increase in cost for new construction.

RB426-13

R905.2.7.1 #2-RB-MCHUGH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The method described is contrary to building science. The method should be shingle fashion which would require the lap to be over not under.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bill McHugh, Chicago Roofing Contractors Association, requests Approved as Submitted.

Commenter's Reason: At the Committee Action Hearings in Dallas, the committee may have misunderstood previous testimony regarding water flow over shingles in varied conditions. On siding, water flow is still downward due to the vertical orientation of siding.

The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing ice and water to lay on the roof. The ice forms a dam, driving water back up the slope of the structure opposite it's normal flow. The behavior of water that is running down a typical roof slope in a ice dam condition is not down the shingle, but instead up and under the shingle due to backup from the ice dam. That's why ice barrier is required in these applications…a material that self seals around nail holes making a continuous membrane that does not leak. This is unlike shingles that are laid and nailed.

If the ice barrier is installed on top of the metal, a 'back water lap' is created where water is driving at the lap in the opposite direction of the normal downward shingle fashion. This common practice is in manufacturer's literature and needs to be codified to provide protection from an important code requirement to consumers.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

RB426-13

Final Action: AS AM AMPC____ D

RB436-13
R905.2.8.3

Proposed Change as Submitted

Proponent: Kirk Nagle, City of Arvada, CO, representing self (knagle@arvada.org)

Revise as follows:

R905.2.8.3 Sidewall flashing. Base flashing against a vertical sidewall shall be ~~continuous or~~ step flashing and shall be a minimum of 4 inches (102 mm) in height and 4 inches (102 mm) in width and shall direct water away from the vertical sidewall onto the roof and/or into the gutter. Where siding is provided on the vertical sidewall, the vertical leg of the flashing shall be continuous under the siding. Where anchored masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and counterflashing shall be provided in accordance with Section R703.7.2.2. Where exterior plaster or adhered masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and Section R703.6.3.

Reason: Step flashing is the approved method of installation by the asphalt roofing manufacturers for sidewall intersections. The method of continuous flashing was removed from the codes in the late 90's because it was a serious problem for leaking, deteriorated roof sheathing and mold. The step flashing moves the water from each layer onto the top of the shingle below so it can move to the gutter and not under the roofing material. If a continuous piece of flashing is used the water can continue under the shingles and eventually onto the underlayment where it can leak and keep the underside of the roofing material wet for long periods of time causing the growth of mold. This installation was used by roofing contractors and was continuous problem for the owners of buildings/homes. The problem was initially thought to be solved by allowing continuous flashing with a kick back (a piece of the metal bent back at over 45 degrees approximately ½ inch of metal) that would keep the water on the continuous flashing and eventually to the gutter, however this created water under the roofing material which would allow for mold growth and leaking. Proper step flashing applied to each shingle puts the water on the upper part of the shingle below and onto the exposed roofing material, which will prevent mold growth and leaking, by having the water under the shingles. I have repaired this problem on many roofs in the past and as a roofing inspector diagnosed the problem of leaks and observed roofing material destroyed by water, roof sheathing destroyed by mold and leaking because water go under the shingles. The water behaves like a funnel one it has a place to go it moves in that direction, just like a siphon. The water moves under the shingles, builds up hydrostatic pressure and forces its way into the tiniest of holes to leak or just keep the underside of the roofing material wet. The continuous flashing was removed from the codes for these reasons and should be removed from the codes today to have proper water resistive systems in place for all buildings/homes.

Cost Impact: The code change proposal will not increase the cost of construction, but will reduce the cost of building maintenance.

RB436-13

R905.2.8.3-RB-NAGLE.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Continuous flashing is not a problem when installed properly. The committee feels this change is not needed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Kirk Nagle, City of Arvada, CO, representing self, requests Approval as Submitted.

Commenter's Reason: Step flashing is the approved method of installation by the asphalt roofing manufacturers for side wall intersections. The method of continuous flashing was removed from the codes in the 90's because it was a serious problem for leaking, deteriorated roof sheathing and mold. The step flashing moves the water from each layer onto the top of the shingle below so it can move to the gutter and not under the roofing material. If a continuous piece of flashing is used the water can continue under the shingles and eventually onto the underlayment where it can leak and keep the underside of the roofing material wet for long periods of time causing the growth of mold. This installation was used by roofing contractors and was a continuous problem for the owners of buildings/homes. The problem was initially thought to be solved by allowing continuous with a kick back(a piece of metal bent back at over 45 degrees approximately ½ inch of material) that would keep the water on the continuous flashing and eventually into the gutter. However this created water under the roofing material which would allow for mold growth and leaking. by having the water under the shingles. I have repaired this problem on many roofs in the past and as a roofing inspector diagnosed the problem of leaks and observed roofing material destroyed by water, roof sheathing destroyed by mold and leaking because water got under the shingles. The water behaves like a funnel once it has a place to go it moves in that direction, like a siphon. The water moves under the shingles, builds up hydrostatic pressure and forces its way into the tiniest of holes to leak or just keep the underside of the roofing material wet. Continuous flashing was removed from the codes for these reasons and should be removed from the codes today to have proper water resistive systems in place for all buildings.

Cost Impact: This will not impact the cost of construction but will reduce the cost of building maintenance.

RB436-13

Final Action: AS AM AMPC____ D

RB438-13
R905.2.8.5

Proposed Change as Submitted

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed ~~over~~ <u>under</u> the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.

Reason: The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing water to lay on the roof driving water back up the slope of the structure.

According to CRCA roofing contractors, if the code required underlayment is applied to the top of the metal drip edge, a seal may be difficult and the water will leak into the structure where a void exists. Voids form due to joints in the metal, uneven or dirty surfaces before application of the underlayment. Further, if underlayment is applied to these flashings, water can be pushed by the ice dam working on the 'back water lap' up slope possibly causing leaks. The leak(s) may be difficult to detect in the concealed space location.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

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

R905.2.8.5-RB-MCHUGH.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Based on the committee's previous action on RB426-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bill McHugh, Chicago Roofing Contractors Association, requests Approved as Submitted.

Commenter's Reason: At the Committee Action Hearings in Dallas, the committee may have misunderstood previous testimony regarding water flow over shingles in varied conditions on both this and RB 426. Therefore, the public comments and reason statements are the same.

On siding, water flow is still downward due to the vertical orientation of siding. The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing ice and water to lay on the roof. The ice forms a dam, driving water back up the slope of the structure opposite it's normal flow. The behavior of water that is running down a typical roof slope in a ice dam condition is not down the shingle, but instead up and under the shingle due to backup from the ice dam. That's why ice barrier is required in these applications…a material that self seals around nail holes making a continuous membrane that does not leak. This is unlike shingles that are laid and nailed.

If the ice barrier is installed on top of the metal, a 'back water lap' is created where water is driving at the lap in the opposite direction of the normal downward shingle fashion. This common practice is in manufacturer's literature and needs to be codified to provide protection from an important code requirement to consumers.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

RB438-13

Final Action:	AS	AM	AMPC____	D

RB440-13
R905.2.8.5

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Delete without substitution as follows:

~~**R905.2.8.5 Drip edge.** A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.~~

Reason: The requirement for drip edge was placed in the code during the past cycle. Following is the reason given by the proponent for the change:

> **Reason:** Unlike the IBC, the IRC does not include drip edge requirements for shingle roofs. This new text brings the IRC into uniformity with the IBC, reflects manufacturers' requirements for shingle roof installations, and uses identical wording and placement as found in IBC 1507.2.9.3.
>
> **Cost Impact:** The code change proposal will not increase the cost of construction.

The proponent's arguments are somewhat conflicted. Although the IBC does require drip edge, the solution for consistency should have been to remove it from the IBC rather than add it to the IRC. The proponent stated that it reflects manufacturer's requirements for shingle roof installations. The proponent provided no evidence of this in support of the statement and, if manufacturers do require drip edge, it would be required by existing language in the IRC (see end of section). In fact, the Asphalt Roofing Manufacturer's Association only ***recommends*** the use of drip edge; they do not say it is required. Then the proponent stated that requiring drip edge where it wasn't previously required would ***not*** increase the cost of construction. Clearly this will increase the cost of construction.

While the committee approved this proposal, their reason statement makes little sense. They state that the drip edge "will provide protection of the shingles and give(s) rigidity to the shingle edges". I'm not sure how drip edge protects the shingles and the projection of the shingles over the roof edge is governed by the manufacturer's installation instructions. Sometimes finding a good reason to approve something is a struggle.

> **Committee Reason:** This is a good change that will provide protection of the shingles and gives rigidity to the shingle edges. This is consistent with the IBC.

The code language also creates a number or problems that need to be considered. The 2012 IRC has been amended to permit overlays (again). The question that comes up is how drip edge can or should be installed in an overlay situation. The Asphalt Roofing Manufacture's Association and drip edge manufacturers don't address that problem. Also, installing drip edge on existing homes with gutters creates another unique problem. Many of the attachment methods for gutters make it virtually impossible to install drip edge along an eave without cutting the drip edge to pieces or removing and reinstalling the gutters which drives up the cost. And there are sure to be roofing contractors who will use the new rules to increase installation costs on their customers and blame the increase on the local building department.

SECTION R905
REQUIREMENTS FOR ROOF COVERINGS

> ***R905.1 Roof covering application.*** *Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions. Unless otherwise specified in this section, roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).*

It is reasonable that this proposal be approved because the current language in the IRC is not well thought out, will create conflicts for reroofing, was not shown to be necessary or to serve any useful purpose, and will increase the cost of construction.

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

R905.2.8.5-RB-DAVIDSON.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this needs to remain in the code. The drip edge does a good job of breaking the capillary action. The drip edge is not a problem for new construction.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.

Exception: Reroofing in accordance with Section R907.

Commenter's Reason: The original proposal was to delete drip edge in its entirety for consistency with manufacturer's installation instructions. The IRC Committee, in disapproving the proposal, stated that it isn't a problem installing drip edge in new construction. The modification leaves the drip edge requirement in place but provides an exception for reroofing.

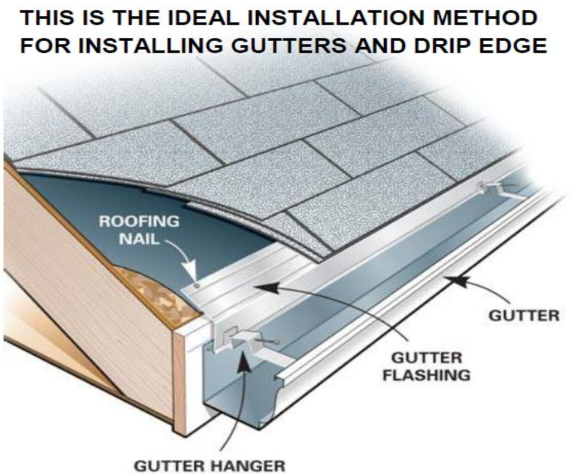
While drip edge can be incorporated in the design of new buildings, existing buildings often have roof details and gutters that make installation of drip edge very expensive to install.

Remember that many thousands if not millions of homes have been constructed and reroofed without drip edge. They exist with all of the existing flashings, gutters, and leaf guards in place. In almost every case, homes with gutters would need to have them removed and then reinstalled to accommodate a drip edge. This creates a significant expense which may include compete replacement of the gutter system if it is damaged upon removal or is not compatible with the drip edge.

In many locales, devices to keep debris out of gutters is a necessity and makes installing drip edge difficult or impossible or at the very least leaves an undesirable visual. Eliminating the ability to have debris guards on gutters increases maintenance costs and increases the likelihood of falls while homeowners clean gutters of leaves and other debris.

Furthermore, the change in the code to permit overlays creates another installation concern that is not addressed in roofing manufacturer's installation instructions.

Does the benefit of a device not required by the manufacturer warrant the cost to install when gutters have to be removed or other expensive steps must be taken? Of course not. Following are some illustrations that depict some of the issues.


THIS IS THE IDEAL INSTALLATION METHOD
FOR INSTALLING GUTTERS AND DRIP EDGE
ROOFING
NAIL
GUTTER
GUTTER
FLASHING
GUTTER HANGER


ANOTHER EXAMPLE OF GUTTERS INSTALLED
AFTER DRIP EDGE


HOW DO YOU INSTALL DRIP EDGE ON THIS
ROOF WITHOUT REMOVING THE GUTTERS?


HOW DO YOU INSTALL DRIP EDGE ON THIS
ROOF WITHOUT REMOVING THE GUTTERS?


WILL YOU STILL BE ABLE TO USE
THESE DEVICES WITH DRIP EDGE?


WILL YOU STILL BE ABLE TO USE
THESE DEVICES WITH DRIP EDGE?

RB440-13

Final Action: AS AM AMPC____ D

RB446-13
R905.16, R905.16.1, R905.16.2, R905.16.3, R905.16.4, R905.16.4.1, R905.16.4.2

Proposed Change as Submitted

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.16 Photovoltaic ~~modules/~~shingles. The installation of photovoltaic ~~modules/~~shingles shall comply with the provisions of this section, Section M2302 and NFPA 70.

R905.16.1 Deck requirements. Photovoltaic shingles shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of three units vertical in 12 units horizontal (3:12) or greater.

R905.16.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 4869 or ASTM D6757.

R905.16.4 Underlayment application. Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

R905.16.4.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached *accessory structures* that contain no *conditioned floor area*.

R905.16.4.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

~~R905.16.1~~ R905.16.5 **Material standards.** Photovoltaic ~~modules/~~shingles shall be listed and labeled in accordance with UL 1703.

~~R905.16.2~~ R905.16.6 **Attachment.** Photovoltaic ~~modules/~~shingles shall be attached in accordance with the manufacturer's installation instructions.

~~**R905.16.3**~~ **R905.16.7 Wind resistance.** Photovoltaic ~~modules/~~shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic ~~modules/~~shingles shall comply with the classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic ~~modules/~~shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

Reason: This code change proposal adds specific requirements for roof decks, roof deck slope, underlayment, underlayment application, ice barrier, and underlayment for high wind areas to Section R905.16.

The specific requirements being added are consistent with similar attributes for other steep-slope, shingle-type roof coverings.

Reference to IRC Section M2302-Photovoltaic Solar Energy Systems and NFPA 70 is added.

This same code change proposal was submitted for consideration as S47-12 for Group A of the International Building Code and was Approved as Modified; the modifications are included as a part of this text here

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

R905.16-RB-GRAHAM.doc

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee feels the PV requirement should be in an appendix and this proposal does not fix all the issues.

Assembly Action: Approved as Modified

Modify the proposal as follows:

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of ~~three~~ two units vertical in 12 units horizontal (~~3~~ 2:12) or greater.

(Portions of proposal not shown remain unchanged)

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified and a Public Comment was submitted.

Modify the proposal as follows:

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of ~~three~~ two units vertical in 12 units horizontal (~~3~~ 2:12) or greater.

(Portions of proposal not shown remain unchanged

Public Comment:

Mark S. Graham, National Roofing Contractors Association, requests Approved as Modified by Assembly Floor Action.

Commenter's Reason: Seeking approval of proposal as approved by assembly floor action as published in the ROH.

RB446-13

Final Action: AS AM AMPC____ D

RB447-13
R907 (NEW)

Proposed Change as Submitted

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Add new text as follows:

SECTION R907
ROOFTOP-MOUNTED PHOTVOLTAIC SYSTEMS

R907.1 Rooftop-mounted photovoltaic systems. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.

R907.2 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R907.3 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.

R907.4 Installation. Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.

R907.5 Photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.

Reason: : This code change proposal is intended to add specific requirements applicable to rooftop-mounted photovoltaic panels and modules, and complement the already existing requirements for photovoltaic solar energy systems in Section M2302.

The roofing-specific requirements proposed here are adapted from IBC Section 1509.7-Photovoltaic Systems, which address rooftop-mounted panel and rack systems.

Building-integrated photovoltaic systems, such as photovoltaic shingles, are already addressed in IRC Section 905.16.

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

RB447-13

R907 (NEW)-RB-GRAHAM.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John Smirnow and Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA), request Approved as Modified by this Public Comment.

Modify the proposal as follows:

~~SECTION R907~~
~~ROOFTOP-MOUNTED PHOTVOLTAIC SYSTEMS~~

~~**R907.1 Rooftop-mounted photovoltaic systems.** Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.~~

R907.2 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

~~**R907.3 Fire classification.** Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.~~

~~**R907.4 Installation.** Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.~~

~~**R907.5 Photovoltaic panels and modules.** Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.~~

Commenter's Reason: Sections referenced as R907.1 and R907.3 through R907.5 are duplicative of language approved by the IRC-Building Committee under RM98-13 Part II, and are no longer needed. This proposal will eliminate conflicts with language approved under RM98 Part II.

Public Comment 2:

John Smirnow and Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA), request Approved as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R907
ROOFTOP-MOUNTED PHOTVOLTAIC SYSTEMS

R907.1 Rooftop-mounted photovoltaic systems. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.

~~R907.2~~ R908.1.2.1 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be designed and installed to resist ~~the~~ component and cladding loads. Component and cladding wind pressures shall be as specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3), or determined according to accepted engineering practice.

R907.3 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.

R907.4 Installation. Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.

R907.5 Photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.

Commenter's Reason: Proposed Section R907.2 is revised to Section R908.1.2.1 to correlate with RM98-13, as approved by the ICC Building Committee.

Determination of applicable wind pressure in Section R908.1.2.1 should not be limited to use of Table R301.2(2) only, as Table R301.2(2) is overly restrictive in most cases. Accepted engineering practice should be specifically referenced, as it is also appropriate to determine wind pressures by more accurate methods. For example, systems conforming to the simple constraints in ICC Evaluation Services Acceptance Criteria AC 428 should be allowed to be designed according to the wind calculation method found in AC 428.

RB447-13

Final Action: AS AM AMPC____ D

RB450-13
R202 (NEW), R907 (NEW), Chapter 44

Proposed Change as Submitted

Proponent: Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (Vickie@intercodeinc.com)

Revise as follows:

SECTION R907
RADIANT BARRIER-ABOVE DECK

R907.1 General. A radiant barrier installed above a deck shall comply with Sections R907.2 through R907.4.

R907.2 Fire Testing. Radiant barriers shall be permitted for use above decks where the radiant barrier is covered with an *approved* roof covering and the system consisting of the radiant barrier and the roof covering complies with the requirements of either FM 4550 or UL 1256.

R907.3 Installation. The low emittance surface of the radiant barrier shall face the continuous air space between the barrier and the roof covering.

R907.4 Material standards. A radiant barrier installed above a deck shall comply with ASTM C1313/C1313M.

Add new definition as follows:

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

Add new standard to Chapter 44 as follows:

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

Reason: The IBC understood this and accepted S51-12, which introduced a new section 1509, following section 1508 on Roof Insulation, associated with Radiant barriers above deck. The present proposal uses the same language accepted into the IBC and proposes it for the IRC, once more following the section on roof insulation (R906) and not as another part of that section.

The new text is necessary for the following reasons:

(1) An important issue that needs to be addressed in the new proposed section R907 is how the fire testing of the system is to be done. The fire testing (FM 4550 or 1256) must be done using the combination of the radiant barrier **and** the approved roof covering and the total system needs to pass the fire test.
(2) A definition is needed for radiant barriers, and one is being proposed, which is identical to the one adopted by the IBC.
(3) A standard specification needs to be referenced, and the same specification (ASTM C1313) is being proposed as was adopted by the IBC.
(4) A key requirement for the installation of radiant barrier products is that there needs to be an air space or air gap between the radiant barrier and the roof covering. This is explained in the proposed section on installation. There is confusion in the market place concerning this “air space” or “air gap”. All radiant barrier applications require an air space on at least one low emittance side of the material. Installations that do not to include an air space do not provide the desired radiant barrier benefit.

Radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements [building codes in Hawaii, Austin, Texas, Florida and I California’s Title 24] and are included in the Energy Star Homes Guidelines.

For information, ASTM has issued separate specifications for radiant barriers used in buildings ASTM C1313, "Standard Specification for Sheet Radiant Barriers for Building Construction Applications" and for reflective insulations used in buildings ASTM C1224, "Standard Specification for Reflective Insulation for Building Applications". This proposal includes a reference to the appropriate specification, ASTM C1313. The scope of ASTM C1313 reads as follows. "This specification covers the general physical property requirements of radiant barrier materials for use in building construction. The scope is specifically limited to requirements for radiant barrier sheet materials that consist of at least one surface, such as metallic foils or metallic deposits mounted or unmounted on substrates. Sheet radiant barrier materials shall consist of low emittance surface(s) that may be in combination with any substrates and adhesives required to meet the specified physical material properties. The following test methods shall be performed: surface emittance; water vapor transmission; surface burning characteristics; corrosivity; tear resistance; and adhesive performance."

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

Analysis: A review of the standard proposed for inclusion in the code, ASTM C 1313/ C1313M with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB450-13

R907 (NEW)-RB-LOVELL.doc

Committee Action Hearing Results

For staff analysis of the content of ASTM C1313/C1313M-12 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Disapproved**

Committee Reason: The committee feels this application is for commercial buildings and is not needed in the IRC. The proponent will rework and bring it back.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, Intercode, Inc., representing Reflective Insulation Manufacturers Association – International, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R907
RADIANT BARRIER-~~ABOVE DECK~~

R907.1 General. ~~A~~ Where provided, radiant barriers ~~installed above a deck~~ shall comply with Sections R907.2 through R907.4.

R907.2 Fire Testing. ~~Radiant barriers shall be permitted for use above decks where the radiant barrier is covered with an *approved* roof covering and the system consisting of the radiant barrier and the roof covering complies with the requirements of either FM 4550 or UL 1256.~~ Radiant barriers shall be tested in accordance with ASTM E84.

R907.3 Installation. Radiant barrier shall be installed in accordance with the manufacturer's installation instructions. The low emittance surface of the radiant barrier shall face ~~the~~ a continuous air space. ~~between the barrier and the roof covering.~~

R907.4 Material standards. ~~A r~~ Radiant barriers ~~installed above a deck~~ shall comply with ASTM C1313/C1313M.

Add new definition as follows:

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

Commenter's Reason: There was very valuable feedback that has been taken into account in the revisions included within this public comment. The revision of this proposal appropriately gears this section towards the elements that are important for a residential application for this product type. Those key elements include:

- Fire testing per E84
- All radiant barriers must have a continuous air space on the low emittance (shiny) side of the product
- The Public Comment provides an ASTM reference – ASTM C1313

This language is important to be included in the code because it clarifies important product fire testing and the key installation requirement, that the product must face a continuous air space – this primary feature is important for Code Officials to be aware of.

Some roofers will install the product as felt – between the deck and shingles – this installation is improper and does not provide a radiant barrier benefit.

Radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements [building codes in Hawaii, Austin, Texas, Florida and I California's Title 24] and are included in the Energy Star Homes Guidelines.

RB450-13

Final Action: AS AM AMPC____ D

RB452-13
R907.3, R907.4, R907.5, R907.6

Proposed Change as Submitted

Proponent: Andy Williams, Metal Construction Association (afwilliams@metalconstruction.org)

Revise as follows:

R907.3 Fire classification. The roof covering fire classification shall not be reduced due to repairs from the fire classification required when installed. The roof covering fire classification for a recovering shall comply with the fire classification in Section R902.

~~**R907.3**~~ **R907.4 Recovering versus replacement.** New roof coverings shall not be installed without first removing all existing layers of roof coverings where any of the following conditions exist:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Exceptions:

1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
2. Installation of metal panel, metal shingle and concrete and clay tile roof coverings over existing wood shake roofs shall be permitted when the application is in accordance with Section R907.5.
3. The application of new protective coating over existing spray polyurethane foam roofing systems shall be permitted without tear-off of existing roof coverings.
4. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.

~~**R907.4**~~ **R907.5 Roof recovering.** Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other *approved* materials securely fastened in place.

~~**R907.5**~~ **R907.6 Reinstallation of materials.** Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Any existing flashings, edgings, outlets, vents or similar devices that are a part of the assembly shall be replaced when rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

~~**R907.6**~~ **R907.7 Flashings.** Flashings shall be reconstructed in accordance with *approved* manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

Reason: Section R907.3 is added to clarify that the roof covering is required to comply with the fire classification mandated by the IRC. For repairs to a roof covering, the repairs are required to maintain the roof covering fire classification required by the IRC when the roof covering was initially installed. For a recovering, the roof covering is required to have the fire classification required by the IRC adopted at the time of the recovering.

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

RB452-13

R907.3 (NEW)-RB-WILLIAMS.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee feels this is already covered in the code and this would introduce redundant language.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

J. William Degnan, President, National Association of State Fire Marshals, requests Approved as Submitted.

Commenter's Reason: This change represents an important concept for the continued protection of roof covering fire classifications where roofs have been recovered or repaired, and bears repeated reference in this Section of the IRC. In addition, the Committee Reason Statement has provided no technical justification for the Disapproval of this concept to be included as a part of the IRC requirements for roof covering repairs or replacements.

RB452-13

Final Action: AS AM AMPC____ D

RB458-13
R1003.18

<u>Proposed Change as Submitted</u>

Proponent: Jim Buckley, Buckley Rumford Co. representing Masonry Alliance for Codes and Standards and Clay Lining Institute (buckley@rumford.com)

Revise as follows:

R1003.18 Chimney clearances. Any portion of a masonry chimney located in the interior of the building or within the exterior wall of the building shall have a minimum air space clearance to combustibles of 2 inches (51 mm). Chimneys located entirely outside the exterior walls of the building, including chimneys that pass through the soffit or cornice, shall have a minimum air space clearance of 1 inch (25 mm). The air space shall not be filled, except to provide fire blocking in accordance with Section R1003.19.

Exceptions:

1. Masonry chimneys equipped with a chimney lining system listed and *labeled* for use in chimneys in contact with combustibles in accordance with UL 1777 and installed in accordance with the manufacturer's installation instructions are permitted to have combustible material in contact with their exterior surfaces.
2. When masonry chimneys are constructed as part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete wall less than 12 inches (305 mm) from the inside surface of the nearest flue lining.
3. Exposed combustible trim and the edges of sheathing materials, such as wood siding and flooring, shall be permitted to abut the masonry chimney side walls, in accordance with Figure R1003.18, provided such combustible trim or sheathing is a minimum of ~~12 inches (305 mm)~~ <u>8 inches (203 mm)</u> from the inside surface of the nearest flue lining. ~~Combustible material and trim shall not overlap the corners of the chimney by more than 1 inch (25 mm).~~

Reason: Tests have shown that the currently required 12" chimney wall thickness for the chimney to be in contact with combustible trim is overly restrictive. Chimneys with enclosing walls of 8" in contact with combustible material are at least as safe as the current basic code requiring chimneys to have 4" thick solid masonry walls two inches clear of combustibles. This change would provide for timber frame or wood ceilings to safely abut a masonry chimney.

Eight Inch Chimney Wall Test
In support of Buckley Code Change Proposal R1003.18 - 9/20/12

Purpose of test: To determine if a chimney built so that the clay flue liner is enclosed with 8" of solid masonry in contact with combustible materials is as safe as the current code requirement that the clay flue liner be enclosed with 4" of solid masonry plus 2" of air space to combustible materials.

We conclude that building chimney walls 8" thick in contact with combustible materials is at least as safe as building chimneys with 4" thick walls 2" clear of combustible materials which is current code.

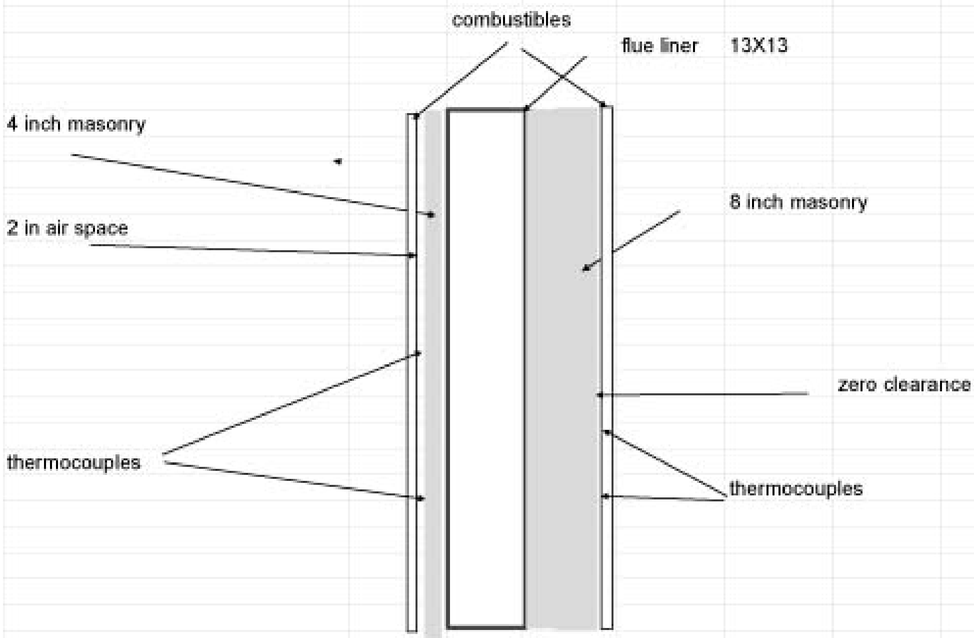
Method: To build a masonry chimney with one side built to code - 4" thick wall plus 2" of air space to combustibles - and the opposite side built 8" thick in contact with combustibles and subject the chimney to flue gas temperatures representing an over fire or chimney fire condition. If the combustibles in contact with the 8" thick masonry did not become as hot as the combustibles 2" clear of a 4" thick masonry chimney wall (the code compliant condition) we can conclude that a chimney with 8" thick walls in contact with combustibles is at least as safe as the code compliant chimney with 4" walls plus a 2" air space to combustibles.

Results:

The combustibles on the code compliant side - 4" thick wall plus 2" of air space to combustibles - reached 90 deg.F above ambient temperature after four hours at a flue gas temperature of 1,000 deg. F while the combustibles in contact with the 8" thick side made it to five hours before reaching 90 degrees above ambient. By that time the combustibles on the code compliant side had reached 45 deg.F above the 90 deg.F above ambient failure temperature.

sept 14 2012 chimney test

4 inch brick with 2 inch air space versus 8 inch brick zero clearance



Time	flue	flue	zero	zero	zero	2 inch	2 inch	2 inch	ambient
start	71	71	66	66	66	66	66	66	56
1 hour	1000	1008	66	66	66	66	71	74	56
2 hr	1000	1005	85	78	79	94	102	111	56
3 hr	1001	992	111	102	104	127	132	137	58
4 hr	1001	993	147	142	142	168	165	175	57
5 hr	1002	995	144	160	168	200	201	197	74
6 hr	1000	992	167	170	170	220	226	227	78
7 hr	1000	992	191	194	197	230	232	236	83
8 hr	1002	995	203	202	205	231	231	240	83
1 hour of cooling time	387	423	217	220	220	211	215	214	85
temps declined after this point									

Test #2 Sept 19, 2012

1 Hr to heat chimney to 1400 then held for 3 hrs at 1400 then spiked to 2100 for 10 min cooled 1 hr and repeated twice

Time									
start	47	49	52	49	51	51	52	49	47
1 hour	1400	1338	52	53	53	71	71	76	52
2 hour	1403	1358	61	62	65	137	142	143	55
3 hour	1403	1355	87	94	101	208	215	218	61
4 hour	1401	1357	127	125	119	243	236	222	60
10 min hold at 2100	2100	1911	107	113	114	236	242	221	61
after 1 hour cool	702	693	136	143	147	235	241	248	64
10 min hold at 2100	2100	1928	131	135	137	239	241	248	62
after 1 hr cool	637	714	135	138	143	229	268	270	64
10 min hold at 2100	2073	1962	127	127	136	218	257	255	64
peak temp during2 1/2 hr cooling	329	406	139	139	180	206	287	288	63

Cost Impact: The code change proposal will not increase the cost of construction, it would reduce the cost.

RB458-13

R1003.18-RB-BUCKLEY.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

J. William Degnan, President, National Association of State Fire Marshals, requests Disapproved

Commenter's Reason: This Code change has been made without acceptable technical justification. Very limited descriptive information has been provided regarding the methodology and substantiation of tests used to justify these reductions in clearances from masonry chimneys to exposed combustible trim and the edges of sheathing materials. Such changes should be reserved pending the use of more widely known or recognized testing criteria.

RB458-13

Final Action: AS AM AMPC____ D

RB460-13
R1005.2

Proposed Change as Submitted

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards and Clay Lining Institute (buckley@rumford.com)

Revise as follows:

R1005.2 Decorative shrouds. Decorative shrouds shall not be installed at the termination of factory-built chimneys except where the shrouds are *listed* and *labeled* for use with the specific factory-built chimney system and installed in accordance with the manufacturer's installation instructions <u>or comply with Section R1003.9</u>.

Reason: It is impractical to test each custom decorative shroud with every listed chimney system so the manufacturers of the various UL listed chimney systems have added "supplementary instructions" to provide minimum dimensions and construction guidelines that are written in prescriptive language that is similar to that already in Section R1003.9 of the code. Individual home builders and manufacturers of chimney rain caps, spark arrestors, chimney caps or shrouds should not have to list their decorative shrouds as long as they meet the requirements set forth in Section R1003.9. This change would not prevent the use of listed decorative shrouds but it would provide for a safe way to install custom decorative shrouds - unlisted by complying with code.

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

RB460-13

R1005.2-RB-BUCKLEY.doc

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed referenced section is for masonry chimneys and is not appropriate for factory built chimneys. This could have the effect of violating the listing.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards and Clay Lining Institute, requests Approved as Modified by this Public Comment.

Modify the proposal as follows:

~~**R1005.2 Decorative shrouds.** Decorative shrouds shall not be installed at the termination of factory-built chimneys except where the shrouds are listed and labeled for use with the specific factory-built chimney system and installed in accordance with the manufacturer's installation instructions or comply with Section R1003.9.~~

Commenter's Reason: We had sought to add a prescriptive option as an alternative to the requirement for a listing for decorative shrouds by referencing Section R1003.9. One member of the IRC Committee said that would be "inappropriate because it cited a masonry section of code."

So now we would like to propose eliminating the whole section R1005.2. Builders would still have to comply with the requirements of R1003.9 which applies to all chimneys - not just listed chimneys - and would still have to use decorative shrouds listed and labeled for use with the specific factory-built chimney system if that is required by the listing for the specific chimney.

Cost Impact: The code change proposal will not increase the cost of construction, it will reduce

Public Comment 2:

Gregg Achman, Hearth & Home Technologies, requests Disapproved.

Commenter's Reason: Section R1003.9 is for masonry chimneys and cannot be applied to factory built chimney systems. Factory built chimney system chases are built with combustible materials and any decorative shroud needs to be tested with the factory built chimney system to ensure that it will not create a fire hazard. Most factory built chimney system shrouds employ added heat shielding, or other design feature requirements, to ensure there is not a fire hazard, since masonry chimneys are made of non-combustible materials there is not a fire hazard concern and the requirements of R1003.9 can be applied safely. The addition of section R1003.9 would likely cause a fire hazard condition if applied to factory built chimney systems, therefore, this comment must be disapproved.

RB460-13
Final Action: AS AM AMPC____ D

RB462-13
Appendix F

Proposed Change as Submitted

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovemn.gov)

Revise as follows:

APPENDIX F
~~RADON CONTROL METHODS~~
PASSIVE RADON GAS CONTROLS
(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques where approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is not less than 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is not less than 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

RADON GAS. A naturally occurring, chemically inert, radioactive gas ~~that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.~~

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene ~~or other equivalent material~~ used to retard the flow of soil gases into a ~~building~~ dwelling.

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

~~**SUBSLAB DEPRESSURIZATION SYSTEM (Active).** A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.~~

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe ~~routed through the *conditioned space* of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab~~ drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

VENT PIPE. Not less than a 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

SECTION AF103
~~REQUIREMENTS~~
PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. ~~The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the *jurisdiction*.~~ The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

~~**AF103.2 Subfloor preparation.** A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:~~

1. ~~A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.~~
2. ~~A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.~~
3. ~~Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.~~

~~**AF103.3 Soil-gas-retarder.** A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly, and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.~~

~~AF103.4~~ AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections ~~AF103.4.1~~ AF103.2.1 through ~~AF103.4.10~~ AF103.2.8.

~~AF103.4.1~~ AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs~~,~~ or other floor assemblies~~,~~ shall be filled with a polyurethane caulk~~,~~ or expanding foam ~~or equivalent sealant~~ applied in accordance with the manufacturer's ~~recommendations~~ installation instructions.

~~**AF103.4.2 Concrete joints.** All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.~~

~~**AF103.4.3 Condensate drains.** Condensate drains shall be trapped or routed through nonperforated pipe to daylight.~~

~~**AF103.4.4**~~ **AF103.2.2 Sumps.** Sumps ~~pits~~ open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or ~~otherwise~~ sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

~~**AF103.4.5**~~ **AF103.2.3 Foundation walls.** Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above ~~finished ground surface~~ grade ~~to prevent the passage of air from the interior of the wall into the living space~~. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be ~~sealed~~ solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of ~~masonry block or wood~~ foundation walls below ~~the ground surface~~ grade shall be filled with polyurethane caulk ~~or equivalent sealant~~. ~~Penetrations of concrete walls shall be filled.~~

~~**AF103.4.6**~~ **AF103.2.4 Dampproofing.** The exterior surfaces of ~~portions of~~ ~~concrete and masonry block~~ foundation walls below ~~the ground surface~~ grade shall be dampproofed in accordance with Section R406.

~~**AF103.4.7**~~ **AF103.2.5** ~~**Air-handling units**~~ **Air-conditioning systems.** ~~Air-handling units~~ Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed ~~to prevent air from being drawn into the unit~~.

> **Exception:** ~~Units~~ Systems with gasketed seams or ~~units~~ that are otherwise sealed by the manufacturer ~~to prevent leakage~~.

~~**AF103.4.8**~~ **AF103.2.6 Ducts.** Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the ~~air-handling~~ air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed ~~to prevent air leakage~~.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

~~**AF103.4.9 Crawl space floors.** Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.~~

~~**AF103.4.10**~~ **AF103.2.7 Crawl space access.** Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or ~~otherwise filled to prevent air leakage~~ sealed.

~~**AF103.5 Passive submembrane depressurization system**~~ **AF103.3 Basements or enclosed crawl spaces with soil floors.** In ~~buildings~~ dwellings with basements or enclosed crawl spaces ~~foundations~~ with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

> **Exception:** ~~Buildings in which an *approved* mechanical crawl space ventilation system or other equivalent system is installed.~~ Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with Section R408.3.

~~**AF103.5.1 Ventilation.** Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.~~

~~**AF103.5.2**~~ **AF103.3.1 Soil-gas-retarder.** The soil in basements and enclosed crawl spaces shall be covered with a ~~continuous layer of minimum 6- mil (0.15 mm) polyethylene~~ soil-gas-retarder. The ~~ground cover~~ soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space ~~area~~. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

~~**AF103.5.3 Vent pipe**~~ **AF103.3.2 "T" fitting and vent pipe.** ~~A plumbing tee or other *approved* connection~~ A 3- or 4-inch "T" fitting shall be inserted ~~horizontally~~ beneath the ~~sheeting~~ soil gas retarder ~~and connected to a 3- or 4-inch-diameter (76 or 102 mm) fitting with a vertical vent pipe installed through the sheeting~~ and be connected to a vent pipe. The vent pipe shall ~~be extended up through the building floors,~~ extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point~~, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings~~.

~~**AF103.6**~~ **AF103.4** ~~**Passive subslab depressurization system**~~ **Basements or enclosed crawl spaces with concrete floors or other floor systems and slab on grade dwellings.** ~~In *basement* or slab-on-grade buildings, the~~ The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces with concrete or other floor systems.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

~~**AF103.6.1**~~ **AF103.4.3** ~~**Vent pipe**~~ **"T" fitting and vent pipe.** ~~A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the subslab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the subslab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the subslab aggregate or connected to it through a drainage system.~~

~~The pipe shall be extended up through the building floors, and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~ Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe shall be permitted to be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

~~**AF103.6.2**~~ **AF103.6 Multiple vent pipes.** In ~~buildings~~ dwellings where interior footings or other barriers separate the ~~subslab aggregate or other~~ gas-permeable ~~material~~ layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

AF103.7 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

~~**AF103.7**~~ **AF103.8 Vent pipe drainage.** All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the ~~slab or~~ soil-gas-retarder.

~~**AF103.8 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan installation through an *attic* or other area outside the *habitable space*.~~

> ~~**Exception:** The radon vent pipe need not be accessible in an *attic* space where an *approved* roof-top electrical supply is provided for future use.~~

AF103.9 Vent pipe identification. All exposed and visible interior ~~radon~~ vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

~~**AF103.10 Combination foundations.** Combination *basement*/ crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.~~

~~**AF103.11 Building depressurization.** Joints in air ducts and plenums in un*conditioned spaces* shall meet the requirements of Section M1601. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11. Fireblocking shall meet the requirements contained in Section R302.11.~~

~~**AF103.12**~~ **AF103.10 Power source and access for future radon fan.** To provide for future installation of ~~an active submembrane or subslab depressurization system~~ a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the ~~*attic* or other~~ anticipated location of ~~vent pipe~~ the radon fans. ~~An electrical supply shall also be accessible in anticipated locations of system failure alarms.~~ An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

Reason: First is it important to point out that the current radon rules only require a "passive" system. The current rules do not require a radon fan and do not regulate fans or "active" systems when they are installed. This proposal does not change that.

Second, there may be flaws in the existing language other than what are pointed out here. For example, current code language does not address some of the fine points of installing a soil-gas-retarder. Someone with greater expertise will need to correct those problems in subsequent code changes if they believe it is necessary.

And third, these rules have gone unchanged since being placed in the appendix of the 2000 IRC. Because they are in the appendix and because they are very infrequently adopted, they have not received the attention they might otherwise have had if they had been in the main body of the code. For those jurisdictions that have had the misfortune of having to enforce radon rules, they have proven problematic because the current rules are not well written and include conflicts, repetitive language, and vagaries. This proposal is intended to rearrange the sections in a more logical manner, create new definitions, delete unnecessary and repetitive language, and eliminate conflicts.

What follows is a section by section explanation of the revisions that are proposed.

APPENDIX F
~~**RADON CONTROL METHODS**~~
PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

Reason: *The proposed title revision is intended to make clear that this appendix chapter only requires "passive radon controls".*

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques when approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

Reason: *The language added to the Scope has been relocated from AF103.1. It seems more appropriate to have this explanatory language in the scope. It further explains that "Active" systems are permitted when approved. There is no attempt here to provide any direction on an appropriate active system since there is none in the current rule.*

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

Reason: *This definition is necessary because the term "crawl space" is frequently used in the section but there is no differentiation between an enclosed and unenclosed crawl space. The presumption here is that a crawl space that is open to the exterior (ex. dwelling constructed on piers) does not pose a risk from radon gas. The application proposed in this revision is that we are only concerned with enclosed crawl spaces.*

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is a minimum of 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

Reason: *Rather than frequent repetition of what constitutes a gas-permeable layer, a definition is proposed. This language is taken from AF103.2. Furthermore, the term "geotextile drainage matting" is replaced with "soil gas collection mat or soil gas matting" which is the term found in the EPA handbook entitled "Build Radon Out". An internet search of those terms will result in many "hits".*

A. Gas Permeable Layer

Usually a 4-inch layer of clean, coarse gravel is used beneath the slab to allow the soil gas to move freely underneath the house. Other options are to install a loop of perforated pipe or soil gas collection mat (also known as drainage mat or soil gas matting).

Additionally, it is proposed that soil gas collection mats be installed in accordance with the manufacturer's installation instructions. The following link is an example of the installation instructions for this particular product indicating that there is significant detail and direction given.
http://www.radon.biz/soilgascollectormattingpriceperrollcomesin45footrolls.aspx

Placing the Mat

1. Lay out the Soil Gas Collector (SGC) on the sub grade after the final preparation and before the concrete is poured. It is typically laid out in a rectangular loop in the largest area with branches or legs into the smaller areas.
2. Position the "T-Riser" in appropriate location and nail down with a 12-inch spike through hole in center.
3. Slide the SGC into openings in "T-Riser" with a portion of the fabric around the outside. Tape the fabric to the outside of the "T-Riser" with duct tape and staple the SGC to the ground with a landscaping staple near the "T-Riser"

4. Roll out the SGC, smooth it onto the ground. To avoid wrinkles and buckling, work away from the "'T-Riser", stapling it to the ground as you go. The SGC should be stapled to the ground every three to four feet, in addition to the corners, "tee's" and ends.
5. Corners are constructed by peeling back the filter fabric, cutting the two ends of the SGC matrix at 45 angles and butting (or overlap no more than 1\2 inch) the matrix together. Pull the filter fabric back and tape into place. Staple across the joint of the matrix and each leg of the corner. Use a minimum of four staples at each corner - two across the joint and one on each leg.
6. The "tees" for branches or legs are constructed by slitting the fabric of the main loop at the location desired. Cut the fabric of branch at the edges and expose 2 inches of the matrix. Cut off the exposed matrix and butt the matrix of the branch (or overlap no more than 1\2 inch) to the matrix of the main loop. Pull the filter fabric of the branch back over the main loop and tape into place. Staple across the joint of the matrix with two staples and one each on the branch and the main loop. Use a minimum of four staples at each "tee"- two across the joint and one on each on the loop and branch
7. All openings in the fabric at joints, "tee's and ends of the branches should be taped to keep out the concrete.
8. When the building is ready for the soil gas vent pipe to be installed, the top of the "T-Riser" is cut off and a four-inch pipe is inserted, caulked with polyurethane and secured with screws. The vent pipe should be labeled to avoid confusion with the plumbing pipes.

Note: The openings in the riser are laid out at 180 to accommodate straight runs of the SGC only. If the riser is to be located in a corner, which is Not uncommon, the front of the "tee" can be cut off and the SGC inserted into the new opening. The side of the "tee" which will not be used should be sealed with duct tape. This creates a "90 tee" which will allow the riser to be placed in a corner with either end of the SGC loop running into the "tee" at a 90 angle.

Pouring Concrete:
The filter fabric that comes sewn around the soil gas collector prevents the wet concrete from entering the mat and reducing its air collection capacity. The only precaution that needs to be taken is that the fabric is duct tape closed at seams of splices and corners sufficiently to keep the uncured concrete from entering.
The mat also needs to be secured to the soil with landscape staples to prevent the concrete from lifting it off the soil while it is being applied. Reinforcing bars and wire can be laid right on top of the mat.
Note that the mat is strong enough to withstand concrete workers and their wheelbarrows as they cross over it during the course of installing the slab.
Riser has special hole and spike for securing it in place.
Making Corners and Splices
The mat should be routed around the inside perimeter of the foundation. This will require an occasional corner. Furthermore, splices will have to be made to join two lengths of mat together. Corners and splices are very easy to make, and do not require any special fittings. Cut back the filter fabric to expose the core material. In the case of a splice merely overlap the core by at least one corrugation replace the cloth and tape it. Use two landscape staples to hold the splice in place. In the case of a corner slice the core of two adjoining legs of the mat at 45-degree angles, overlap the edges by one corrugation, tape the cloth and landscape staple together. The corner is illustrated below:
Cut back the cloth. Cut the core at a 45 degree angle. Overlap corrugations
Replace filter cloth. Duct tape edges to keep out concrete. Staple in place.
Connecting The Mat To The Riser
A convenient riser with a dual entry allows for either end of the loop of mat to be secured to the soil gas vent riser. Slide the mat into either end of the riser and tape the edge to prevent wet concrete from entering.
The riser comes with a molded cap to keep out concrete Later this cap can be cut off and the 4" Sch. 40 PVC riser can be inserted, screwed and caulked into place
Risers are often placed in corners for convenience of later pipe routing. The plastic riser "tee" can be cut to allow for such situations.

RADON GAS. A naturally occurring, chemically inert, radioactive gas ~~that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.~~

Reason: *There is a significant amount of commentary and unnecessary language in this definition that is proposed for deletion.*

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene ~~or other equivalent material~~ used to retard the flow of soil gases into a ~~building~~ dwelling.

Reason: *There are two editorial revisions in this definition. The first deletes the reference to equivalencies which is frequently found in the section. Equivalencies are always permitted by R104.11. The second revision replaces the term "building" with "dwelling" here and throughout the section. This is to help make clear that the rules apply only to the dwelling and not an accessory building such as a garage.*

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

Reason: *The term "basement or" is added to avoid conflicts where an underfloor space that meets the definition of a basement does not have a concrete or other floor system but only a soil floor.*

~~**SUBSLAB DEPRESSURIZATION SYSTEM (Active).** A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.~~

__Reason:__ It is necessary that code language be easily understood by the public and code enforcement. Including language in the code that references non-required systems conflicts with that goal and can mislead the use and interpretation of the rule simply because the extra language exists. The feeling is that it must somehow apply because it is there. Users of the code may confuse the definition for active systems with passive systems and misapply the rule. The IRC language only requires a ***passive*** *system. While it is necessary to define a passive system, it is not necessary to define an active system. It is therefore reasonable to delete this language as it serves no purpose.*

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe ~~routed through the *conditioned space* of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab~~ drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

__Reason:__ It is not necessary to repeat language in the definition that is found elsewhere. Furthermore, a definition is proposed for the term "vent pipe" that contains the deleted language. The added language is for clarification and consistency with the definition of submembrane depressurization system.

VENT PIPE. A minimum 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

__Reason:__ Again this definition is proposed to avoid the need to frequently repeat what a vent pipe is.

SECTION AF103
~~REQUIREMENTS~~
PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. ~~The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the *jurisdiction*.~~ The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

__Reason:__ The sentence deleted has been moved to the Scope as that is a more appropriate location.

~~**AF103.2 Subfloor preparation.** A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:~~

1. ~~A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.~~
2. ~~A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.~~
3. ~~Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.~~

~~**AF103.3 Soil-gas-retarder.** A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly, and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.~~

__Reason:__ The two previous sections have been relocated to the subslab and submembrane sections below so that they are located more appropriately. Also, a new definition for "gas-permeable layer" has been added to the definitions that incorporates much of the language in AF103.3.

~~AF103.4~~ AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections ~~AF103.4.1~~ AF103.2.1 through ~~AF103.4.10~~ AF103.2.7.

~~AF103.4.1~~ AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs~~,~~ or other floor assemblies~~,~~ shall be filled with a polyurethane caulk~~,~~ or expanding foam ~~or equivalent sealant~~ applied in accordance with the manufacturer's ~~recommendations~~ installation instructions.

__Reason:__ These are largely editorial revisions but also provide for the use of expanding foam in larger spaces where caulking is not appropriate.

~~**AF103.4.2 Concrete joints.** All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.~~

__Reason:__ This section requires that various joints in the floor slab be "sealed". The EPA booklet "Build Radon Out" gives some perspective on the need to "seal" these joints. The text found on page 51 follows:

Seal control joints

Control joints in the concrete slab, whether they are saw cut or made with grooving tools, should be cleaned and filled with caulk. Even if they are not cracked initially, they will likely develop cracks in the future and caulking them before the floor finishes are in place makes sense. A gun-grade polyurethane or a flowable polyurethane can be used. This seal does not interfere with the expansion of the control joint, but does block radon entry.

The presumption advanced by the EPA booklet is that these joints, even if not initially cracked, will eventually crack and "caulking them before the floor finishes are in place makes sense".

However, the EPA booklet also states that one purpose for installing the soil gas membrane (plastic sheeting), is that it can bridge cracks that develop in the floor. This is stated on page 42 of the booklet.

Laying plastic sheeting between the gas permeable layer and the concrete slab or floor assembly serves several important purposes. The sheeting can prevent concrete from flowing down and clogging the gas permeable layer. It can also bridge any cracks that may develop in the slab or floor assembly, thereby reducing soil gas entry. Finally, the plastic sheeting can act as a vapor barrier to reduce moisture and other soil gas entry into the home.

If the plastic serves to bridge cracks, installing a sealant in the joints at the time of construction is redundant and unnecessary. The plastic will always be there. My argument is that the radon doesn't know what kind of crack it is trying to penetrate so that it cannot be more aggressive with a construction joint than it can with a crack due to shrinkage or expansion.

Also, I have received complaints from new homeowners that the sealant used in the joints in basement floors is slow to cure and that it gets on shoes and is tracked all over the new home. Clearly this is not an acceptable situation.

Also, flooring contractors complain about the caulking joint causing visible ridges in some flooring products and they almost always scrape the floors before installation removing most, if not all, of the caulking.

If the home has a crawl space, the plastic sheeting only need be overlapped by twelve inches. It is not required to be sealed. It is therefore unreasonable to seal a joint in a concrete floor over a plastic sheet when laps in the sheet do not need any special treatment when there is no floor. There just is no reasonable explanation that can be given.

Therefore, it is necessary that this section of the rule be deleted. This proposal is reasonable because sealing the joints is redundant given the language in the EPA booklet and laps in plastic sheeting need not be sealed when there is no floor.

~~**AF103.4.3 Condensate drains.** Condensate drains shall be trapped or routed through nonperforated pipe to daylight.~~

Reason: *Why can't condensate drains discharge to a floor drain or a sump? Why must they be trapped? This is already regulated by M1411.3.*

~~**AF103.4.4**~~ **AF103.2.2 Sumps.** Sumps ~~pits~~ open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or ~~otherwise~~ sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

~~**AF103.4.5**~~ **AF103.2.3 Foundation walls.** Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above ~~finished ground surface~~ grade ~~to prevent the passage of air from the interior of the wall into the living space~~. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be ~~sealed~~ solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of ~~masonry block or wood~~ foundation walls below ~~the ground surface~~ grade shall be filled with polyurethane caulk ~~or equivalent sealant~~. ~~Penetrations of concrete walls shall be filled.~~

Reason: *Revisions are editorial to eliminate repetition, commentary language, and for clarity.*

~~**AF103.4.6**~~ **AF103.2.4 Dampproofing.** The exterior surfaces of ~~portions of concrete and masonry block~~ foundation walls below ~~the ground surface~~ grade shall be dampproofed in accordance with Section R406.

Reason: *Editorial revisions.*

~~**AF103.4.7**~~ **AF103.2.5** ~~**Air-handling units**~~ **Air-conditioning systems.** ~~Air-handling units~~ Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed ~~to prevent air from being drawn into the unit~~.

Exception: ~~Units~~ Systems with gasketed seams or ~~units~~ that are otherwise sealed by the manufacturer ~~to prevent leakage~~.

Reason: *The term "air-handling units" is not defined. "Air-conditioning systems" is defined in the IRC as: A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith." It is best to use a defined term to avoid confusion.*

~~**AF103.4.8**~~ **AF103.2.6 Ducts.** Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the ~~air-handling~~ air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed ~~to prevent air leakage~~.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

Reason: *Editorial revisions. Additionally, when the code includes language such as "to prevent air leakage", some code officials will interpret that to create a standard and that some testing is undertaken to illustrate that the standard is met. Some code officials will require a pressure test of the space to demonstrate that there is no air leakage. The presumption here is that such a standard was not intended.*

~~**AF103.4.9 Crawl space floors.** Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.~~

Reason: *These openings are already required to be sealed for purposes of fireblocking in section R302.11.*

~~**AF103.4.10**~~ **AF103.2.7 Crawl space access.** Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or ~~otherwise filled to prevent air leakage~~ sealed.

Reason: *Elimination of commentary language. Additionally, when the code includes language such as "to prevent air leakage", some code officials will interpret that to create a standard and that some testing is undertaken to illustrate that the standard is met. Some code officials will require a pressure test of the space to demonstrate that there is no air leakage. The presumption here is that such a standard was not intended.*

~~**AF103.5 Passive submembrane depressurization system**~~ **AF103.3 Basements or enclosed crawl spaces having soil floors.** In ~~buildings~~ dwellings with basements or enclosed crawl spaces ~~foundations~~ with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: ~~Buildings in which an *approved* mechanical crawl space ventilation system or other equivalent system is installed.~~ Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with R408.3.

__Reason:__ Editorial revisions. Revisions also recognize any underfloor space with a soil floor regardless of what the space is called. Also, the exception references an "approved mechanical crawl space ventilation system or other equivalent system." It is not clear what the criteria might be for approving such a system or an equivalent system to that approved. So what is proposed here is the continuous mechanical exhaust system identified in R408.3.

~~**AF103.5.1 Ventilation.** Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.~~

__Reason:__ Crawl spaces are already required to be ventilated by R408.1. It isn't necessary to repeat that language here.

~~**AF103.5.2**~~ **AF103.3.1 Soil-gas-retarder.** The soil in basements and enclosed crawl spaces shall be covered with a ~~continuous layer of minimum 6- mil (0.15 mm) polyethylene~~ soil-gas-retarder. The ~~ground cover~~ soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space ~~area~~. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

__Reason:__ Editorial revisions. The last two sentences are taken from AF103.3 as the rules are applicable at this location.

~~**AF103.5.3 Vent pipe**~~ **AF103.3.2 "T" fitting and vent pipe.** ~~A plumbing tee or other *approved* connection~~ A 3- or 4-inch "T" fitting shall be inserted ~~horizontally~~ beneath the ~~sheeting~~ soil gas retarder ~~and connected to a 3- or 4-inch-diameter (76 or 102 mm) fitting with a vertical vent pipe installed through the sheeting~~ and be connected to a vent pipe. The vent pipe shall ~~be extended up through the building floors,~~ extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point~~, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings~~.

__Reason:__ Largely editorial but also recognizing that definitions address the deleted language.

~~**AF103.6**~~ **AF103.4** ~~**Passive subslab depressurization system**~~ **Basements or enclosed crawl spaces having concrete floors or other floor systems and slab on grade dwellings.** ~~In *basement* or slab-on-grade buildings, the~~ The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces having concrete or other floor systems.

__Reason:__ Editorial revisions. Revisions also recognize any underfloor space with a concrete or other floor system regardless of what the space is called. It is not uncommon for crawl spaces to have concrete floors.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

__Reason:__ This is text that has been relocated from AF103.2.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

__Reason:__ This text has been relocated from AF103.3.

~~**AF103.6.1**~~ **AF103.4.3** ~~**Vent pipe**~~ **"T" fitting and vent pipe.** ~~A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the subslab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the subslab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the subslab aggregate or connected to it through a drainage system. The pipe shall be extended up through the building floors, and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~ Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

__Reason:__ Largely editorial but also recognizing that definitions address the deleted language. A portion of the new text came from AF103.3.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe may be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

__Reason:__ This is new text that recognizes that a sump or drain tile can be used in a passive radon system.

~~**AF103.6.2**~~ **AF103.5 Multiple vent pipes.** In ~~buildings~~ dwellings where interior footings or other barriers separate the ~~subslab aggregate or other~~ gas-permeable ~~material~~ layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

__Reason:__ Editorial revisions.

AF103.5 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

__Reason:__ This section has been relocated from later in the section to group like requirements. It has also been editorially revised for clarity.

~~**AF103.7**~~ **AF103.8 Vent pipe drainage.** All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the ~~slab or~~ soil-gas-retarder.

~~**AF103.8 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan installation through an *attic* or other area outside the *habitable space*.~~

~~**Exception:** The radon vent pipe need not be accessible in an *attic* space where an *approved* roof-top electrical supply is provided for future use.~~

__Reason:__ This section has been moved to the end of the section to group like requirements.

~~**AF103.9**~~ **AF103.9 Vent pipe identification.** All exposed and visible interior ~~radon~~ vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

~~**AF103.10 Combination foundations.** Combination *basement*/ crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.~~

__Reason:__ This section has been moved up to group like requirements.

~~**AF103.11 Building depressurization.** Joints in air ducts and plenums in un*conditioned spaces* shall meet the requirements of Section M1601. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11. Fireblocking shall meet the requirements contained in Section R302.11.~~

__Reason:__ It seems unnecessary to repeat requirements that are found elsewhere in the code.

~~**AF103.12**~~ **AF103.10 Power source and access for future radon fan.** To provide for future installation of ~~an active submembrane or subslab depressurization system~~ a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the ~~*attic* or other~~ anticipated location of ~~vent pipe~~ the radon fan~~s~~. ~~An electrical supply shall also be accessible in anticipated locations of system failure alarms.~~ An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

__Reason:__ This text applies to providing a space and power source for the future installation of a radon fan. The term "attic" has been deleted as it unnecessarily confuses where the placement of the electrical termination should be. The term "other anticipated location" implies that the fan could be placed anywhere, not just an attic. And since active systems aren't regulated, there will be no oversight to the final location of a fan anyway. The reference to "system failure alarms" is deleted as there are non-electrical ways of monitoring active systems and it would seem that the same box used to power the fan could power the alarm.

To aid in understanding the impact of these changes, what follows is the revised text minus the cross-outs and underlines.

APPENDIX F
PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AF101
SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques when approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102
DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is a minimum of 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

RADON GAS. A naturally occurring, chemically inert, radioactive gas.

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene used to retard the flow of soil gases into a dwelling.

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

VENT PIPE. A minimum 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

SECTION AF103
PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.2.1 through AF103.2.8.

AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or expanding foam applied in accordance with the manufacturer's installation instructions.

AF103.2.2 Sumps. Sumps open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

AF103.2.3 Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above grade. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of foundation walls below grade shall be filled with polyurethane caulk.

AF103.2.4 Dampproofing. The exterior surfaces of foundation walls below grade shall be dampproofed in accordance with Section R406.

AF103.2.5 Air-conditioning systems. Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed.

Exception: Systems with gasketed seams or that are otherwise sealed by the manufacturer.

AF103.2.6 Ducts. Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

AF103.2.7 Crawl space access. Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or sealed.

AF103.3 Basements or enclosed crawl spaces having soil floors. In dwellings with basements or enclosed crawl spaces with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with R408.3.

AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a soil-gas-retarder. The soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

AF103.3.2 "T" fitting and vent pipe. A 3- or 4-inch "T" fitting shall be inserted beneath the soil gas retarder and be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.4 Basements or enclosed crawl spaces having concrete floors or other floor systems and slab on grade dwellings. The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces having concrete or other floor systems.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

AF103.4.3 "T" fitting and vent pipe. Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe may be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

AF103.6 Multiple vent pipes. In dwellings where interior footings or other barriers separate the gas-permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

AF103.7 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

AF103.8 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the soil-gas-retarder.

AF103.9 Vent pipe identification. All exposed and visible interior vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

AF103.10 Power source and access for future radon fan. To provide for future installation of a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the anticipated location of the radon fan. An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

Cost Impact: None

APPENDIX F-RB-DAVIDSON

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a good and needed update and reorganization of the appendix. The proponent should reach out to the radon experts and resolve the technical issues and bring back a public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Kapturowski, Spruce Environmental Technologies, Inc, representing American Association of Radon Scientists and Technologists (AARST), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Delete Appendix F in its entirety and substitute as follows:

~~APPENDIX F~~
~~RADON CONTROL METHODS~~

APPENDIX F
RADON REDUCTION

SECTION AF101
SCOPE

AF101.1 This appendix contains requirements for new construction in *jurisdictions* where significant potential for elevated indoor *radon* exists. Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of *radon* zone 1 & 2 designation in accordance with section AF103.42.

SECTION AF102
DEFINITIONS

ACCESS (limited). For the purpose of Appendix F, the point of entry to a fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purpose of Appendix F, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. For the purpose of Appendix F, a mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. Procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, "egg crate" support of a fabric enclosure or similar means. Also referred to as "Vent Strip".

LICENSED. For the purpose of Appendix F, a designation applied to individuals or companies that are qualified and specifically authorized as *radon* laboratories, measurement or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purpose of Appendix F, a *certified* or *licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. Any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NRAL* is defined as the US Environmental Protection Agency's Action Level of 4 *pCi/L* [148 Bq/m^3].

PIPE LOOP. For the purpose of Appendix F, a continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purpose of Section AF103, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.
SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purpose of Appendix F, the location where the *soil gas collector* is connected to the *ASD* system piping.

SECTION AF103
RADON REDUCTION

AF103.1 General. This Section applies to *radon* control methods for buildings and structures within EPA *radon* zones 1 & 2, as defined in Section AF103.42. *Rough-Ins* or complete *Active Soil Depressurization (ASD)* systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor *radon* levels below the *National Radon Action Level (NRAL*).

AF103.2 Mitigation system required. A *mitigation system Rough-In* shall be installed in dwellings located in *radon* potential zones 1 and 2 in accordance with Section AF103.5. The *radon* potential zones shall be determined in accordance with Section AF103.42.

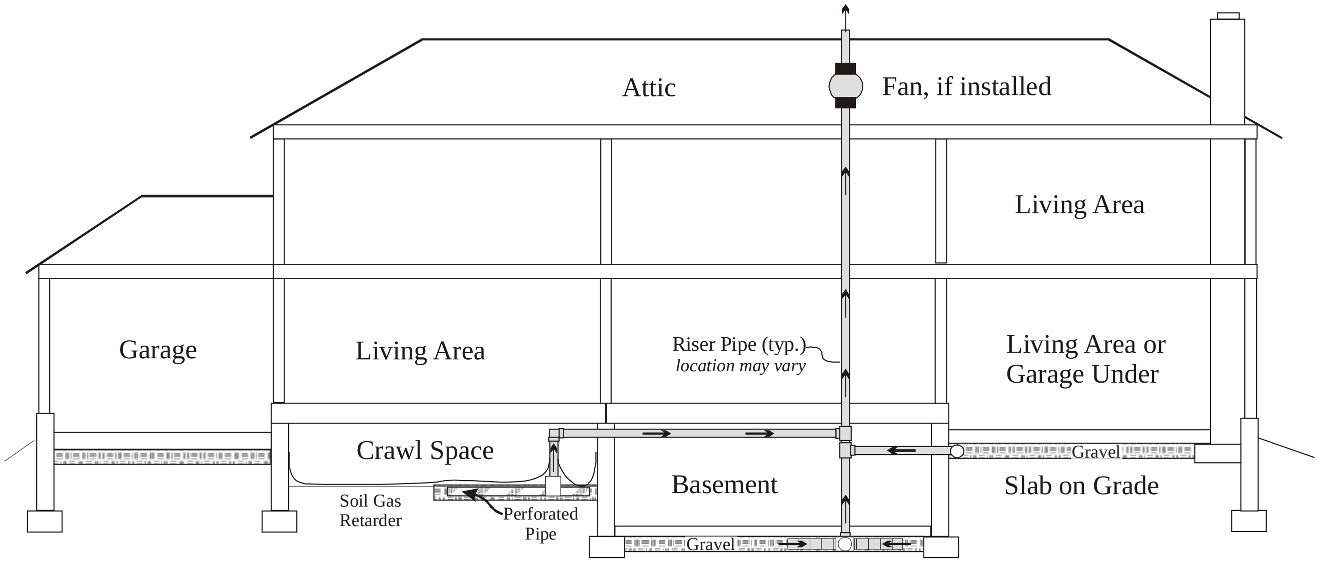
> **Exception:** Where the foundation system does not have any enclosed area of soil contact and where prior to occupancy, testing in accordance with Section AF103.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*).

AF103.3 Design. The design of *radon mitigation systems* shall comply with Section AF103 and for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* that is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* that is *certified* or *licensed* to design such systems.

AF103.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

AF103.5 Mitigation system rough-in required. The *rough-in* installation of a *mitigation system* shall be required for all foundations and combination foundations types, including crawl space, basement, slab-on-grade and slab-on-grade garage located below a living area. The installation shall be in accordance with Sections AF103.6 through AF103.28. Figure AF103.5 illustrates the four foundation types.

FIGURE AF103.5
FOUNDATION TYPES



AF103.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections AF103.7 through AF103.9.6.

AF103.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections AF103.7.1 through AF103.7.7 and Section AF103.9.

AF103.7.1 Soil gas collector. One *soil gas collector* for each *suction point* (AF103.7.2) shall be installed in accordance with Section AF103.7.1.1, AF103.7.1.2 or AF103.7.1.3.

AF103.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section AF103.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

AF103.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

AF103.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

AF103.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section AF103.7.2.1, AF103.7.2.2 or AF103.7.2.3, as applicable for the type of plenum installed.

AF103.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical "up" position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section AF103.8.1.1.3 and served by one or more *suction points*.

AF103.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner to facilitate airflow from the collector. One opening of the fitting or device shall be oriented in a vertical "up" position.

AF103.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a gravel *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

AF103.7.3 Suction points not permitted. *Suction points* shall not be permitted on sump lids

AF103.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

AF103.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections AF103.7.5.1 through AF103.7.5.4.

AF103.7.5.1 Sheeting. The *soil gas retarder* membrane shall comply withASTM E1745
Class A, B or C.

AF103.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

AF103.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

AF103.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

AF103.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

AF103.7.7 Membrane label required. *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast with the color of the background on which the lettering is applied.

AF103.8.1 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections AF103.8.1.1 through AF103.9.6.

AF103.8.1.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section AF103.8.1.1.1, AF103.8.1.1.2 or AF103.8.1.1.3.

AF103.8.1.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified in accordance with ASTM C33.

AF103.8.1.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

AF103.8.1.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench backfilled with clean aggregate that complies with Section AF103.8.1.1.1 and surrounds the pipe on not less than 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be not less than 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or a method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

AF103.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section AF103.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections AF103.8.2.1, AF103.8.2.2 or AF103.8.2.3 as applicable for the type of *soil gas collector* installed.

AF103.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel* type *soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the gravel layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide a not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

AF103.8.2.2 Geotextile layer soil gas collector. A *suction point* for a geotextile type *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner that maintains airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

AF103.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop* type collector shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

AF103.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section AF103.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section AF103.8.1.1.3 and is served by not less than one *suction point*.

AF103.8.4 Suction points not permitted. *Suction points* shall not be permitted on sump lids.

AF103.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

AF103.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* installed in accordance with Section AF103.8.6.1.

AF103.8.6.1 Sheeting. Polyethylene sheeting not less than 6 *mils* [0.152 mm] thick, or cross-laminated polyethylene sheeting not less than 3 *mils* [0.076 mm] thick shall be installed on top of the *soil gas collector*, shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections AF103.8.6.1.1 through AF103.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

AF103.8.6.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

AF103.8.6.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

AF103.8.6.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

AF103.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder,* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

AF103.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

AF103.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

AF103.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section AF103.8.10.1, AF103.8.10.2 or AF103.8.10.3.

AF103.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

AF103.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

AF103.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

AF103.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections AF103.9.1 through AF103.9.6.

AF103.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid that is sealed with a gasket or silicone caulk and mechanically fastened in a manner that facilitates removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

AF103.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted**.** Other penetrations through foundation walls shall be sealed**.**

AF103.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

AF103.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

AF103.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

AF103.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

AF103.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections AF103.11 through AF103.19.

AF103.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

AF103.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

AF103.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

> **Exception:** Rigid, non-perforated PVC pipe complying with ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

AF103.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that allow water to collect shall be prohibited.

AF103.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections AF103.15.1 and AF103.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

AF103.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

AF103.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

AF103.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals not exceeding 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals not exceeding 10 feet [3048 mm].

AF103.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

AF103.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

AF103.19 Labels required (piping). *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not greater than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that contrasts with the color of the background on which the lettering is applied.

AF103.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

AF103.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

AF103.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

AF103.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such, but not limited to, those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

AF103.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where a required *ASD fan* will be installed. The space provided for the *ASD fan* shall be located in accordance with AF103.35. The *ASD* pipe shall be centered in this space.

AF103.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

AF103.25.1 Label. The over-current device for the branch circuit supplying *ASD fans* shall be labeled to indicate that it supplies the *radon* fan.

AF103.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled to indicate its purpose.

AF103.26 Fan access. Limited *access* shall be provided for each *ASD fan* location to allow installation of *ASD fans* and replacement of same. *Access* entry shall be located not more than 20 feet [6096 mm] from the *ASD fan* location.

AF103.27 Radon test kit required. Not less than one long term *radon*-in-air test kit from a *certified* or *licensed* laboratory shall be provided for the occupants of each dwelling unit.

AF103.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed and activated in accordance with Sections AF103.30 through AF103.41.

> **Exception:** Where prior to occupancy, testing in accordance with Section AF103.41 indicates that the building has a *radon* level below the *National Radon Action Level* (*NRAL*) and the *Rough-In* piping is labeled in accordance with Section AF103.29.

AF103.29 Labels required, system *Rough-In*. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: **"**This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that contrasts with the color of the background on which the lettering is applied.

AF103.30 Fan selection. Fans installed in the *ASD* system shall be recommended by the manufacturer for *radon* mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or *soil gas* from the fan housing and shall be sized in accordance with Table AF103.33 or as specified by a *certified* or *licensed radon mitigator*.

TABLE AF103.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	TOTAL FOUNDATION AREA		
	Less Than 1600 sq. feet	**1600 to 2500 sq. feet**	**Greater than 2500 sq. feet**
	Less Than 149 sq. meters	**149 to 232 sq. meters**	**Greater than 232 sq. meters**
(3 inch) [76 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF2** RF2 Minimum rating:[a] 75 cfm @ 1.0 in. WC [127m^3/hr @ 250 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*
(4 inch) [102 mm]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	Use Radon Fan Type: **RF1** RF1 Minimum rating:[a] 50 cfm @ 0.5 in. WC [85m^3/hr @ 125 Pa]	*Radon* fan to be sized by *certified* and/or *licensed radon mitigator*

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

AF103.31 Orientation. *ASD* inline fans shall be installed only on vertical *ASD* piping.

AF103.32 Installation. *ASD fans* shall be installed in accordance with the manufacturer's instructions.

AF103.33 Flexible connectors required. *ASD fans* shall be connected to the *ASD* piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

AF103.34 Fan start-up. *ASD fans* shall be electrically energized upon installation on the *ASD* system piping.

AF103.35 Fan location. *ASD fans* shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. *ASD fans* shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in any basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. *ASD fans* shall not be mounted in any location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

AF103.36 System monitor required. Each *ASD* system shall be provided with a system negative pressure monitor such as, but not limited to, a manometer type pressure gauge to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

AF103.37 Startup marking. *ASD* system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

AF103.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

AF103.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that contrasts with the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies. and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

AF103.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color that contrasts with the color of the background on which the lettering is applied.

AF103.40 Documentation package. The occupants of the dwelling shall be provided with a documentation package that includes the following:

1. A description of system operation, such as shown in Exhibit 1 "Understanding a Radon Reduction System".
2. All *radon* test data for the property.
3. The annual energy consumption of the installed *ASD fan*(s), whether estimated or actual, and the projected monetary cost of such energy.

AF103.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NRAL*, a *certified* or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NRAL* are achieved.

AF103.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure AF103.42 or from Table AF103.42. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure AF103.42 and Table AF103.42.

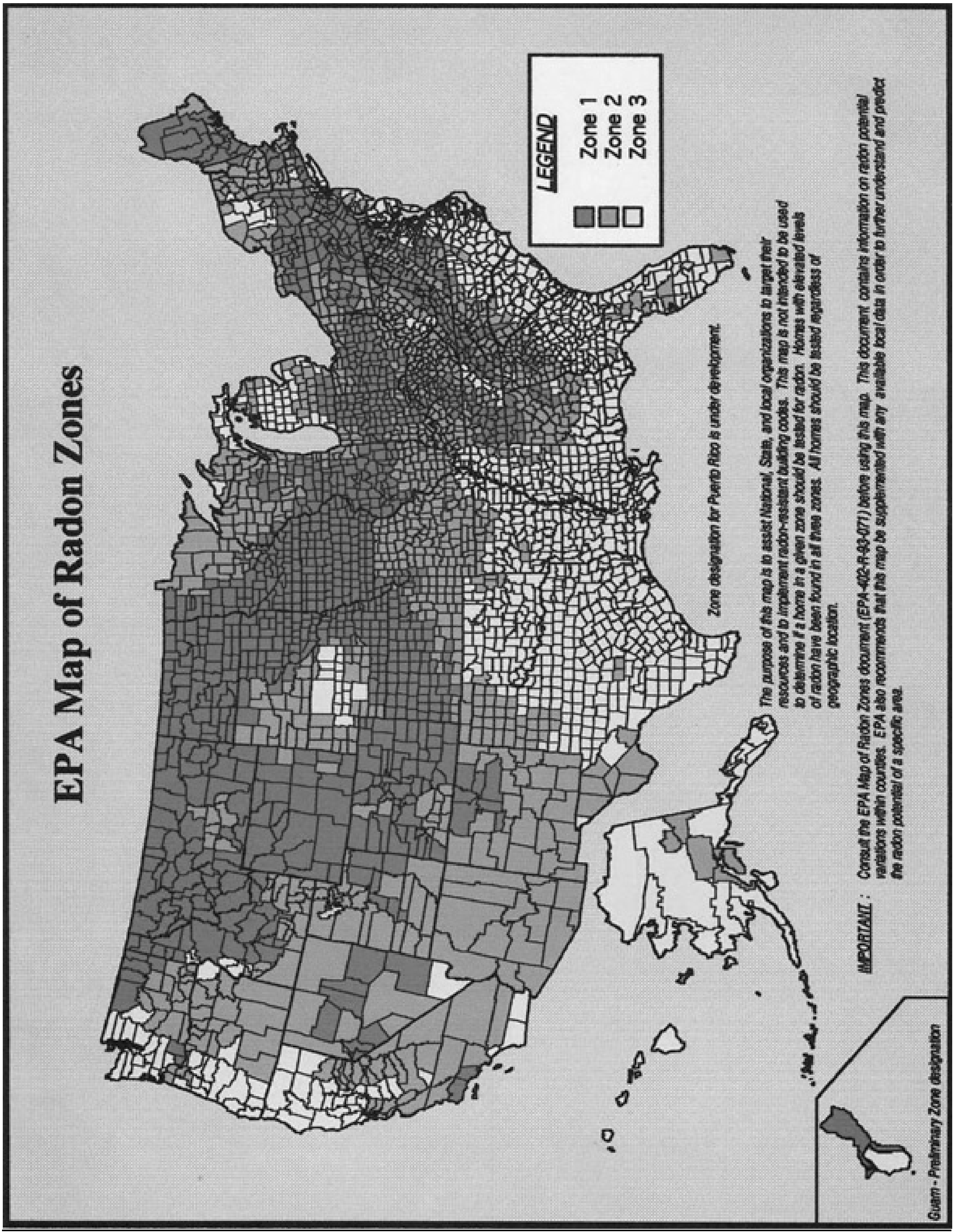


FIGURE AF103.42
RADON POTENTIAL ZONES MAP

TABLE AF103.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

Alabama

Zone 1
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega

Zone 2
Autauga
Barbour
Bibb
Blount
Bullock
Cherokee
Chilton
Cullman
Dallas
DeKalb
Elmore
Etowah
Fayette
Greene
Hale
Jefferson
Lamar
Lee
Lowndes
Macon
Marion
Marshall
Montgomery
Perry
Pickens
Randolph
Russell
Shelby
St Clair
Sumter
Tuscaloosa
Walker
Winston

Alaska

Zone 2
Anchorage Municipality
Dillingham Census Area
Fairbanks North Star Borough
Kenai Peninsula Borough
Matanuska-Susitna Borough
Southeast Fairbanks Census Area

Arizona

Zone 2
Apache
Cochise
Coconino
Gila
Graham
Greenlee
La Paz
Maricopa
Mohave
Navajo
Pima
Pinal
Santa Cruz
Yavapai
Yuma

Arkansas

Zone 2
Baxter
Benton
Boone
Carroll
Fulton
Garland
Independence
Izard
Marion
Montgomery
Randolph
Searcy
Sharp
Stone

California

Zone 1
Santa Barbara
Ventura

Zone 2
Alameda
Alpine
Amador
Calaveras
Contra Costa
El Dorado
Fresno
Inyo
Kern
Los Angeles
Madera
Mariposa
Mono
Monterey
Nevada
Placer
Plumas
Riverside
San Benito
San Bernardino
San Francisco
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Sierra
Tulare
Tuolumne
Yuba

Colorado

Zone 1
Adams
Arapahoe
Baca
Bent
Boulder
Broomfield
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
La Plata
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Sedgwick
Summit
Teller
Washington
Weld
Yuma

Zone 2
Alamosa
Archuleta
Conejos
Costilla
Eagle
Hinsdale
Lake
Mineral
Rio Grande
Routt
Saguache
San Juan

Connecticut

Zone 1
Fairfield
Middlesex
New Haven
New London

Zone 2
Litchfield
Tolland
Windham

Delaware

Zone 2
New Castle

Florida

Zone 2
Alachua
Citrus
Columbia
Hillsborough
Leon
Marion
Miami-Dade
Polk
Union

Georgia

Zone 1
Cobb
DeKalb
Fulton
Gwinnett

Zone 2
Banks
Barrow
Bartow
Butts
Carroll
Catoosa
Cherokee
Clarke
Clayton
Coweta
Dawson
Douglas
Elbert
Fannin
Fayette
Floyd
Forsyth
Franklin
Gilmer
Greene
Habersham
Hall
Haralson
Harris
Hart
Heard
Henry
Jackson
Jasper
Lamar
Lumpkin
Madison
Meriwether
Monroe
Morgan
Newton
Oconee
Oglethorpe
Paulding
Pickens
Pike
Rabun
Richmond
Rockdale
Spalding
Stephens
Talbot
Towns
Troup
Union
Upson
Walker
Walton
White
Whitfield

Hawaii

------None-----

Idaho

Zone 1
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2
Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2
Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin
Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2
Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio
Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1
Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene
Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattamie
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington
Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2
Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick
Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2
Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll
Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell
Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-------None------

Maine

Zone 1
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2
Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

Zone 2
Allegany
Anne Arundel
Baltimore City
Cecil
Charles
Garrett
Prince George's
Somerset

Massachusetts

Zone 1
Essex
Middlesex
Worcester

Zone 2
Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2
Alcona
Alger
Alpena
Antrim
Baraga
Barry
Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorency
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook
Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape Girardeau
Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk
Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2
Golden Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York
Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith
Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire

Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

Socorro
Torrance
Union
Valencia

New Jersey

Zone 1
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga
Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman
Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga
Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2

Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River
Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2
Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson
Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2
Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam
Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan
Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe

Zone 2
Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince Edward
Prince William
Rappahannock
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

Zone 2
Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2
Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis
Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2
Adams
Ashland
Barron
Bayfield
Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealeau
Vilas
Washburn
Waushara
Winnebago

Wyoming

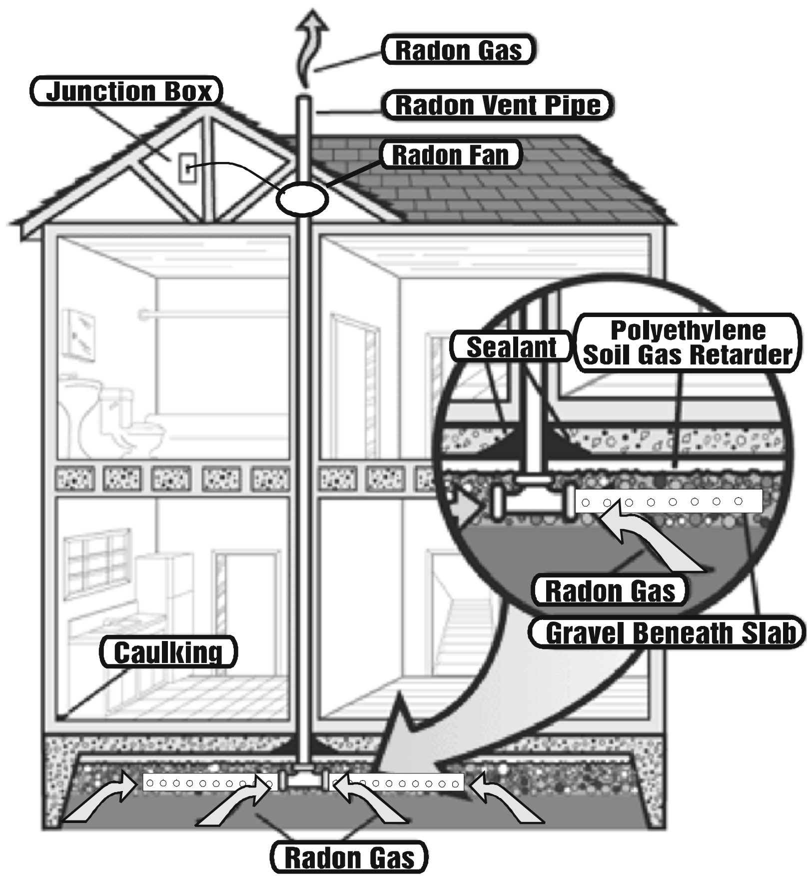
Zone 1
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2
Platte
Weston

AF103.43: Exhibit 1 - Understanding a Radon Reduction System (Occupants)

General: *Radon* is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock and water and gets into the air you breathe. The *radon* potential of any specific building lot is dependent on whether there is sufficient *radon* source material in the ground below the home and sufficient upward air movement for the *radon* to be near your home's foundation. *Radon* typically moves up through the ground to the air above and into your home through gaps and other holes in the foundation. The primary health concern associated with *radon* is lung cancer. The Environmental Protection Agency (EPA) estimates that 21,000 people die in the US each year from *radon*-induced lung cancer.

Radon Reduction System: Your new home was constructed with an *Active Subslab Depressurization* (*ASD*) System to protect your family's health. The *ASD* system is designed to limit *radon* entry into your home by keeping the soil under your home at a lower pressure than the air in your home. In doing so, *radon* and other *soil gases* from below your home are exhausted above your roof through a specially designed *radon* fan. An *ASD* system is recognized by the EPA as the Best Available Technology for *radon* control because it keeps much of the *radon* from entering your home. The system is designed to run 24 hours a day, 7 days a week. The electrical power required to run the fan, which is the only active component in the system, will typically cost 5 to 25 cents per day depending upon the type of fan and your electrical utility rates. Cost to operate this fan would be less than operating a normal light bulb.



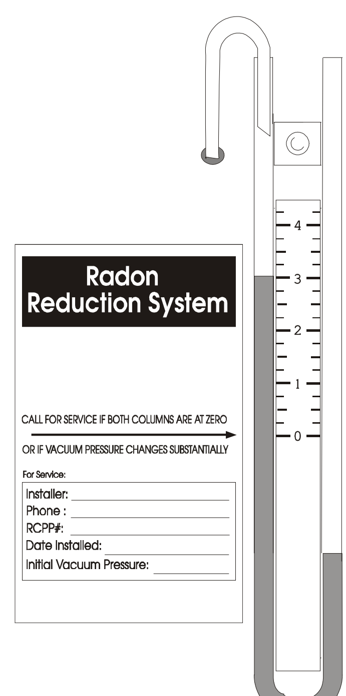
System Maintenance: Your *ASD* System is designed to provide many years of service under normal conditions without significant maintenance. As the occupant of this home, you need to routinely check the system pressure gauge or other system monitor to verify that the fan is operating correctly. There are various labeled components of your *radon* system such as pipe, crawlspace membrane, fan, system pressure monitor and sump basin. DO NOT ALTER OR DISCONNECT any of these components. If the sump basin is opened for required maintenance or repair, restore to the original condition immediately after completing work. You also need to be aware that foundation settling, renovations or additions to your home can change your indoor *radon* concentrations. A *certified/licensed radon mitigator* can provide guidance when changes are to be made to the *dwelling* or provide a routine check-up on the operation of the system.

Understanding the System Pressure Gauge: The pressure gauge shown on the right is typical of a gauge used to monitor the pressure developed in the piping system by the *radon* fan. Your fan pressure should be checked regularly to ensure the fan system continues to operate properly. This gauge measures pressure in Inches Water Column (in. WC). This gauge does NOT measure *radon*.

Call for service if the measure changes substantially (20% or more) or if the gauge reads zero pressure (both columns equal).

Your *ASD* system may have an audible alarm to alert you to call for service in the event of a problem.

Radon Testing: Your builder left behind a long term test kit for you to use to test your home after you move in. The way you and your family live in your new home, how you set heating and cooling controls or use your clothes dryer and other exhaust fans can affect indoor *radon* levels. It is recommended that you test for a minimum of 3 months or preferably longer to determine your actual *radon* exposure in the home. Be sure to check the warranty your builder provides to make certain you complete your testing before the end of the new home warranty period.
Follow the instructions provided by the test laboratory to open, activate and place the test kit to test your *radon* levels.



The USEPA recommends that you retest your home at least every 2 years or if major renovations or additions are made to the *dwelling*.

Other sources of radon: *Radon* can also be found in the water from private wells. Testing can determine if your well contains significant amounts of *radon*.

More Info: For more information on *radon*, *radon* testing or *radon* removal: **www.epa.gov/radon**

NOTE: Exhibit 1 may be reprinted without license.

Add to Chapter 3 Bibliography as follows:

ASTM D5926-11 – "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "
ASTM E1745-11 – "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Commenter's Reason: 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 & 2. More than 2 million homes being constructed in the US with elevated indoor radon concentrations in the past 25 years. Voluntary adoption of this Appendix can reduce the risk of radon exposure and prevent lung cancer.

The existing Appendix F of the IRC (Radon Control Methods) is inadequate and 20 years old. The proposal presented herein was developed as an ANSI consensus standard by the AARST Radon Standards Consortium. This standard, AARST/ANSI #CCAH-2013 *"Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses,"* was produced by a committee of (27) representing radon professionals, home inspectors, home builders, architects, code officials, consumer advocates and state and federal government.

The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9

NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		**1,834,775**		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction where adopted. Most homes can be built with only a mitigation system Rough-In. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system Rough-In (passive) =$296*

Cost of fan driven mitigation system = $707* (total cost, not in addition to $296)

Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

RB462-13

Final Action: AS AM AMPC____ D

RB465-13

Appendix G, R324 (New), R324.1 (New)

Proposed Change as Submitted

Proponent: Kris Bridges, CBO, Chair, ICC Swimming Pool Code Drafting Committee (SPCDC)

Delete Appendix G in its entirety:

~~APPENDIX G~~
~~SWIMMING POOLS, SPAS AND HOT TUBS~~

Add new Section and new text as follows:

SECTION R324
SWIMMING POOLS, SPAS AND HOT TUBS

R324.1 General. The design and construction of aquatic vessels shall comply with the *International Swimming Pool and Spa Code*.

Reason: The drafting of the *International Swimming Pool and Spa Code* (ISPSC) started in October/2010 by the Swimming Pool Code Drafting Committee (SPCDC) which was established by the ICC Board of Directors, with the Association of Pool & Spa Professionals (APSP) as a Cooperating Sponsor. The SPCDC was a broad based committee representing a balance of interests composed of 15 individuals from public, private and nonprofit sectors with expertise in disciplines critical to the topics in the *International Swimming Pool and Spa Code*. The SPCDC was supported by four Work Groups composed of numerous interested parties and stakeholders.
The intent was to develop a comprehensive set of regulations for swimming pools and spas consistent and coordinated with the I-Codes. Technical content was developed from provisions from the International Codes and the applicable APSP standards. The APSP standards considered were:

- ANSI-1 2003 Public Swimming Pools
- ANSI-2 1999 Public Spas
- ANSI-3 1999 Permanent Residential Spas
- ANSI-4 2007 Aboveground/On-ground Residential Swimming Pools
- ANSI-5 2003 Residential In-ground Swimming Pools
- ANSI-6 1999 Portal Spas
- ANSI-7 2006 Suction Entrapment Avoidance
- ANSI-8 2005 Model Barrier Code
- ANSI-9 2005 Aquatic Recreational Facilities
- ANSI-11 2009 Standard for water quality in public swimming pools and spas

The SPCDC and its Work Groups comprehensively reviewed the requirements in the existing 2009 International Codes and the standards noted above in an effort to draft comprehensive language for pool and spa safety while at the same time making sure the language resulted in adoptable and enforceable I-Code language.
The SPCDC held three face-to-face drafting meetings and there were weekly work group conference calls. The drafting effort of the SBCDC culminated in Public Version 1.0 (PV 1.0) which was completed in February/2011.
Public Version 1.0 was then subjected to a full cycle of ICC Code Development in 2011 as follows:

- PV 1.0 posted for code change submittals on February 1, 2011
- 100 code changes were submitted
- The ISPSC code committee comprised of both SBCDC members and new members acted on the code changes at the 2011 Code Development Hearings held May 16, 2011 in Dallas.
- Public comments were submitted on 22 of the code changes and were acted on by the ICC membership at the 2011 Final Action Hearings held October 31, 2011 in Phoenix
- The 2012 International Swimming Pool and Spa Code is published.

The ISPSC uses the term “aquatic vessels” to cover all types of vessels including pools, water parks, spas and hot tubs. This proposal is limited to the use and application of vessels under the IRC, including pools, spas and hot tubs. The ISPSC provisions comprehensively address all aspects of such vessels including;

- Administration and Definitions

- Construction features for pools including size and depth, wall and floor construction, and calculation of bather occupant load
- Safety features such as barriers to pool entry, depth markers and throwing ropes
- Mechanical, plumbing and electrical provisions
- Equipment such as suction entrapment avoidance, circulation, filters, pumps and motors, skimmers, heaters, return and suction fittings
- Appurtenances such as ladders and diving equipment

The ISPSC covers both residential and public aquatic vessels. A similar proposal was submitted to Section 3109 of the IBC in Group A 2012 (G193 Part I). The committee action was AM. The final action was D.

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

APPENDIX G-RB-BRIDGES.doc

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This change is appropriate and provides a pointer to the ISPSC. The proponent should work with the opponents to resolve the questions about the pool deck interface and bring back a public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Matt Archer, City of Lone Tree, representing Colorado Chapter ICC, requests Disapproval.

Commenter's Reason: This proposal broke the most cardinal rule of the IRC, everything you need to build a house is in one book. If the SPCDC wants these requirements in the IRC they should include them individually, not by reference.
Second, this proposal moved an appendix which talks about flood ways and barriers to the body of the code and THEN replaced it with a whole host of new requirements:

Additional administration section
Mechanical, plumbing and electrical provisions
Ladders and diving equipment
Pool construction
Calculation of occupant loads
Throwing ropes
New decking requirements
And on and on….

This change went too far too fast without proper vetting of all the details the SPCDC wanted to add to the IRC.

Public Comment 2:

Glenn Mathewson, MCP, City of Westminster, Colorado, representing North American Deck and Railing Association, requests Disapproval.

Commenter's Reason: Eliminating Appendix G and referencing the Swimming Pool and Spa Code will have negative affects on code administration and the decking industry.

Eliminates the option of separately adopting pool and spa provisions in the appendix from general residential construction provisions in the body of the IRC:

Unlike other common construction features throughout the IRC, swimming pools and spas are specialized, and they're only installed in a limited percentage of homes in many regions of the county. Locally, there can be some controversy over the building code regulating prefabricated and kit pools and spas, as in a consumer protection agenda. Many jurisdictions do not wish to regulate the filling of a 30-inch deep flexible plastic pool with an inflatable ring. If they did, they'd likely only look at the security barrier…the one that can be adopted by choice with Appendix G and found conveniently in the IRC. Maintaining pool and spa provisions in the appendix chapter allows more flexibility in governmental code adoption.

Makes the security barrier provisions most referenced by local code administrators and general contractors much more inaccessible:

Including excerpts from specialized standards within the appendix makes those standards accessible and affordable for widespread use and application. For the average code administrator, they are not capable of enforcing fine details of swimming pool and spa construction, either from a lack of knowledge or lack of resources. Specialized pool contractors and spa manufacturers stay on top of these standards. Where the appendix is adopted, code administrators are able to easily access the information these contractors are not generally knowledgeable in, such as the security barrier. Removing the security barrier provisions from the IRC forces administrators to reference and purchase an additional document, the ISPSC, thus raising the cost to maintain access to provisions they once possessed.

Expanded subject matter in the ISPSC, beyond the standards currently referenced in Appendix G, was not fully vetted by industry and will blindside local jurisdictions and contractors with regulation they were not prepared for or agreeable to:

The ISPSC section 306 provides very specific provisions for wood and composite decks adjacent to pools and spas. These new provisions are not common practice in either the deck industry or code administration. By replacing the provisions and references within Appendix G with a blanket reference to the ISPSC, considerably controversial provisions NOT accepted by or developed with the decking industry, will be newly required. A 15 minute video explaining these provisions is available at www.deckcodes.com. These brand new provisions for decking around pools and hot tubs should not become a reference from the IRC without further industry wide knowledge, contribution and approval. The reference to the pool and spa code is not an even swap with Appendix G. The ISPSC is brand new and is not widely adopted across the nation. This code should be fully vetted and proven successful as a standard before becoming tied to the IRC.

With a disapproval vote, code adoption and enforcement can be flexible to the needs of each jurisdiction. The following are examples of such variety:

1. A jurisdiction **does not** want to regulate pools and spas at the local level: They choose not to adopt Appendix G. Installers and manufacturers are still expected to follow Federal regulations and standards.
2. A jurisdiction **does** want to regulate pools and spas at the local level, and they intend to inspect security barriers: They choose to adopt appendix G. They get easy access to security barrier provisions and the installers and manufacturers are still expected to follow the requirements in the referenced standards and any Federal regulations.
3. A jurisdiction **does** want to regulate pools and spas at the local level and wishes to be very knowledgeable on the subject. They like having lots of codebooks on their shelves and in their budget. They choose not to adopt appendix G but they do adopt the ISPSC and purchase the reference to the security barrier and other information. Prior to adoption of the ISPSC, they will likely review it. At that time, they may decide they do not agree with the heavy-handed provisions for composite and wood decks around pools and hot tubs.

This commenter encourages the proponent of this proposal to consider a future proposal where architectural and general provisions from the ISPSC that are most likely to be administered at the local level are referenced in Appendix G. Perhaps similar to how the IFGC provisions are referenced in brackets.

RB465-13

Final Action: AS AM AMPC____ D

RB467-13
Appendix J

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

AJ102.4 Replacement windows and replacement safety glazing. Regardless of the category of work, when an existing window, including the sash and glazed portion, or safety glazing is replaced, the replacement window or safety glazing shall comply with the following requirements as applicable: ~~of Chapter 11.~~

AJ102.4.1 Energy efficiency. Replacement windows shall comply with the requirements of Chapter 11.

AJ102.4.2 Safety glazing. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.

AJ102.4.3 Emergency escape and rescue openings. Where windows are required to provide *emergency escape and rescue openings*, replacement windows shall be exempt from the maximum sill height requirements of Sections R310.1 and the requirements of Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.
3. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*

AJ102.4.4 Window control devices. Where window fall prevention devices complying with ASTM F2090 are not provided, window opening control devices complying with ASTM F 2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and,
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit.

~~**AJ301.3 Safety glazing.** Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.1.~~

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "Child Window Safety". The scope of the activity is noted as:

To evaluate the necessity of developing code proposals for the inclusion of requirements dealing with the conditions, circumstances and devices for window safety which could reduce the number of falls by children to surfaces below.

The purpose of this proposal is to coordinate the existing building provisions of the IRC with the changes approved to the IBC/IEBC in the 2012 Group A cycle. Code changes G225-12 and G227-12 were approved as modified by public comment to revise Section 3407 of the IBC (IEBC Section 406 – see below). In addition, Code change G201-12 last cycle removed the existing building provisions from Chapter 34 of the IBC in favor of a reference to the IEBC. This action was subsequently affirmed by the ICC Board as this was a code change related to I-Code scoping.

The format/terminology of Appendix J in the IRC is a bit different than the approach in the IEBC. However, Section AJ102 stipulates that the provisions of the section are applicable to all categories of work. It is for this reason that the provisions have been comprehensively located in AJ102 versus the sections that deal with the different categories of work (ie repairs in AJ301; renovations in AJ401; and alterations in AJ501.

For reference, the approved IEBC text is as follows:

IEBC SECTION 406
GLASS REPLACEMENT AND REPLACEMENT WINDOWS

406.1 Replacement glass. *The installation or replacement of glass shall be as required for new installations.*

406.2 Replacement Window Opening Control Devices. *In Group R-2 or R-3 buildings containing dwelling units, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:*

1. *The window is operable;*
2. *The window replacement includes replacement of the sash and the frame;*
3. *The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;*
4. *The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and*
5. *The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).*

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1029.2.

Exceptions:

1. *Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.*
2. *Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.*

406.3 Replacement Window Emergency Escape and Rescue Openings. *Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 provided the replacement window meets the following conditions:*

1. *The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.*
2. *The replacement of the window is not part of a change of occupancy.*

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG’s are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG’s held over 70 conference calls in 2012.

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

AJ102.4-RB-BALDASSARRA-CTC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. The proponent should bring back a public comment to address the committee's concern about the largest standard window size.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

J. William Degnan, President, representing National Association of State Fire Marshals, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**AJ102.4.3 Emergency escape and rescue openings**. Where windows are required to provide *emergency escape and rescue openings*, replacement windows shall be exempt from the maximum sill height requirements of Sections R310.1 and the requirements of Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 provided the replacement window meets the following conditions:~~

1. ~~The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.~~
2. ~~The replacement window is not part of a change of occupancy.~~
3. ~~Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings.*~~

(Renumber subsequent sections)

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The purpose of this Comment is to delete the Exceptions for increases to maximum sill heights for replacement windows. It is also intended to retain the requirements for maximum sill heights for emergency escape openings as currently stated in other Code provisions.

The sill heights for openings utilized as emergency escape for occupants of residential spaces, as well as for emergency access by first responders, play a critical role in the emergency escape from fires. As stated, AJ 102.4.3 would provide no restriction for the sill heights for replacement windows along emergency escape routes from dwelling units. Even though a size criteria remains, access to the opening by occupants remains a primary consideration for the overall intended use of the escape opening, by both building occupants seeking escape from the fire and for fire service personnel seeking escape from untenable conditions. In addition, the lack of restriction of sill heights could present further restriction of fire department rescue operations from both inside and outside of the dwelling unit.

It is understood that the proponent was directed to address issues concerning the largest standard window size. It is the intent of this Comment that the maximum sill height issue also be considered in the overall approach to the use of these openings for both emergency escape and rescue.

RB467-13

Final Action: AS AM AMPC____ D

RM2-13
M1305.1

<u>Proposed Change as Submitted</u>

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1305.1 Appliance access for inspection service, repair and replacement. *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances*, or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*. ~~Installation of room heaters shall be permitted with at least an 18-inch (457 mm) working space. A platform shall not be required for room heaters.~~

<u>**Exception:** The installation of room heaters shall comply with manufacturer's instructions.</u>

Reason: This revision is a simple text cleanup to eliminate permissive language and unclear text. The current next to last sentence says that room heaters are allowed to have a working space of 18 inches, but does not actually require that. What is an 18 inch work space? 18" x 18", 18" x 30" ?? The last sentence says that a platform is not required, yet nowhere in this section is a platform ever required. The working space is assumed to be the floor area. In the case of room heaters, it is simple to defer to the manufacturer's instructions for the required service access. This is generally not an issue anyway because room heaters are necessarily out in the open.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M1305.1-RM-HALL-PMGCAC

<u>Committee Action Hearing Results</u>

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason**.**

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1305.1 Appliance access for inspection service, repair and replacement. *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances*, or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*.

~~**Exception:** The installation of room heaters shall comply with manufacturer's instructions.~~

Commenter's Reason: The exception is redundant. M1410.1 already covers this. If we are to make an exception here directing the access for room heaters to meet the manufacturer's instructions, then we will need to do the same for radiant heating systems (M1406.1), duct heaters (M1407.1), vented floor furnaces (M1408.1) and so on and on.

RM2-13
Final Action: AS AM AMPC____ D

RM3-13
M1305.1.3.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1305.1.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by location or lamp guards.

Reason: The typical lamp holder (fixture) used for attics and crawl spaces is a porcelain lamp holder with a naked incandescent lamp in it. It is often placed such that service personnel can impact it with their body, tools or materials. The result is broken glass, falling hot metal lamp filaments, possible lacerations, a shock hazard and sudden darkness to top it all off. The use of simple lamp cages/guards or locating the lamp holders out of harm's way will protect service personnel, which is the intent of this entire code section.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M1305.1.3.1-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. No additional cost is involved to simply locate the lamp where impact is unlikely.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1305.1.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by ~~location or~~ lamp guards or one of the following methods:

1. Exposed lamps shall not be located over the passageway access opening, the appliance, or the required passageway between the passageway access opening and the appliance.
2. Exposed lamps shall be located not less than 6 feet 8 inches above the walking surface of the passageway and above the passageway access opening..

Commenter's Reason: The language approved by the committee is very subjective and would lead to a lack of uniform enforcement. This public comment would solve that problem by defining the space where lamp guards are required. This will aid enforcement and simplify compliance by removing any ambiguity for the code official and the installer.

RM3-13

Final Action: AS AM AMPC____ D

RM4-13
M1305.1.4.3

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1305.1.4.3 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. <u>Exposed lamps shall be protected from damage by location or lamp guards.</u>

Reason: The typical lamp holder (fixture) used for attics and crawl spaces is a porcelain lamp holder with a naked incandescent lamp in it. It is often placed such that service personnel can impact it with their body, tools or materials. The result is broken glass, falling hot metal lamp filaments, possible lacerations, a shock hazard and sudden darkness to top it all off. The use of simple lamp cages/guards or locating the lamp holders out of harm's way will protect service personnel, which is the intent of this entire code section.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M1305.1.4.3-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Same reason as RM3-13

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1305.1.4.3 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by ~~location or~~ lamp guards.

> <u>**Exception:** Lamp guards shall not be required where exposed lamps are not located over the passageway access opening, the appliance, or the passageway between the passageway access opening and the appliance.</u>

Commenter's Reason: The language approved by the committee is very subjective and would lead to a lack of uniform enforcement. This public comment would solve that problem by defining the space where lamp guards are required. This will aid enforcement and simplify compliance by removing any ambiguity for the code official and the installer.

RM4-13

Final Action: AS AM AMPC____ D

RM8-13
M1308.1, M1308.2.1 (New), M1308.2.2 (New), M1308.2.3 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1308.1 Protection against physical damage. ~~In concealed locations where *piping*, other than cast iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 inches (38 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored and shall extend not less than 2 inches (51 mm) above sole plates and below top plates.~~ Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections M1308.2.1 through M1308.2.3.

Exception: Cast iron piping and galvanized steel piping shall not be required to be protected.

Add new text as follows:

M1308.2.1 Piping through bored holes or notches. Where *piping* is installed through holes or notches in framing members and the piping is located less than 1 ½ inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend 2 inches (51 mm) to each side of the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend 2 inches (51 mm) above the bottom framing member and 2 inches (51 mm) below the top framing member.

M1308.2.2 Piping in other locations. Where the piping is located within a framing member and is less than 1 ½ inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 ½ inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

M1308.2.3 Shield plates. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage).

Reason: This proposal was approved for the 2015 IFGC. This proposal provides clear requirements for where shield plates are needed. Section M1308.1 uses the term “light frame construction assemblies” to describe wall, floor and roof assembles that can be made up from either wood members or light frame, cold formed steel members.

Section M1308.2.1 covers applications where piping runs perpendicular to a framing member and passes through a bored hole or notch in the framing member. This text is nearly the same as what is currently in the IRC. If the piping is within 1 ½ inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the width of the framing member plus 2 inches on either side of the framing member. Protection of the piping on either side of the framing member is needed because it is too easy for a membrane/fastener installer to miss the framing member’s fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member. Section M1308.2.1 also covers the application where piping runs perpendicular to and penetrates top and bottom plates, or top and bottom tracks. Protection of the piping above the bottom framing member (or below the top framing member) is needed because it is too easy for a membrane/fastener installer to miss the framing member’s fastening face or penetrate the member at an angle and hit the piping just outside of the framing member. The code fails to address the situation where piping is run within the C-channel of a metal stud or joist and it also fails to address piping run parallel to a framing member.

Section M1308.2.2 covers applications where the piping runs alongside of a framing member or in the case of a light frame, cold formed steel framing member, piping that runs parallel to the length of and within the framing member (in other words, within the channel section). If the piping is within 1 ½ inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield pate that covers the width of the piping by the length of piping that is within the 1 ½ inch proximity of the framing member's fastening face. Piping that is located behind the fastening face of the member and within 1 ½ inches of the fastening face of the member obviously needs protection from fastener penetration. Piping that is located adjacent to and within 1 ½ inches of the fastening face of the member needs protection because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member. A similar requirement in Section E3802.1 applies to wiring run parallel to framing members.

The opposition to this proposal for the IPC was related to the requirement to protect the length of piping that is run parallel to a framing member and less than 1 ½ inches from the member face to which wall board will be screwed or nailed. The concern was expressed that it would be difficult to protect the pipe for its full length, making the assumption that the pipe ran from the bottom plate up through the top plate in walls. First of all, it is unlikely that an installer would install piping from plate to plate that close to the stud, since it would be nearly impossible to drill holes that close to the stud. Secondly, the obvious way to avoid installing protection for the pipe is to simply keep it at least 1 ½ inches away from the framing member. With a little planning, the installation of pipe protection could be easily avoided.

The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M1308.1-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: Approved as Submitted

Committee Reason: Approval was based upon the proponent's published reason. The proposal will provide protection for refrigeration piping in walls.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Michael Cudahy, representing Plastic Pipe and Fitting Association (PPFA) , requests Disapproval.

Commenter's Reason: This change could have serious negative implications, including requiring extensive shielding for floor, wall, and ceiling radiant heating systems based on hydronic tubing in residential construction. The proposal will increase cost of construction and the level of hazard found in the fuel gas code, which does have shielding requirements, is far greater compared with hydronic systems found in the mechanical code. Urge disapproval.

Public Comment 2:

Richard Grace, Fairfax County Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: The protection requirements contained within this code text is overly aggressive. A basic example of this would be having a 2" hydronic pipe installed vertical, secured to a 2 x 4 stud. If this pipe extended the full distance of the 8' stud, a shield plate will have to be installed the entire length of the stud, on both sides of the stud, extending out beyond the hydronic pipe; or a shield plate that will measure at least 8' x 4". This leaves no area to attach a wall membrane.

This same proposal was disapproved by IMC, IPC, and IFGC committees. More interesting, the same IRC-Plumbing and Mechanical committee that approved this proposal, previously <u>disapproved</u> the identical companion proposal RP13-13.

Public Comment 3:

Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors, requests Disapproval.

Commenter's Reason: This proposal represents an unnecessary rewrite of existing text, and adds new requirements to protect every pipe that falls within 1-1/2 inches from a stud. There is no justification that residential refrigerant lines or condensate lines need more protection than currently provided. Identical proposals have been previously rejected by the IMC, IPC, and IRC-P committees. Let's maintain consistency by also disapproving in the IRC-M.

RM8-13
Final Action: AS AM AMPC____ D

RM9-13
M1401.3

Proposed Change as Submitted

Proponent: Richard Grace, Fairfax County VA, representing The Virginia Plumbing and Mechanical Inspectors Association and the Virginia Building and Code Officials Association

Revise as follows:

M1401.3 Equipment/appliance Sizing. Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

> **Exception:** Heating and cooling equipment and appliances shall not be limited to the capacities determined in accordance with Manual S where any of the following conditions apply:
>
> 1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with Manual J fall within the range of the manufacturer's published capacities for that equipment or appliance.
> 2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with Manual J and the manufacturer's next larger standard size unit is specified.
> 3. The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.

Reason: Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Item 3 - The current code language does not have provisions for sizing appliances for minimal dwelling unit or dwelling addition loads, other than forcing owners and contractors to change appliances to less desirable systems. For example; a 2 story townhouse, in climate zone 4, with 600 square feet per floor wants to utilize a two-zone system, or a separate heat pump system for each floor. A 1.5 ton unit per floor would exceed the requirements of Manual S, however a 1.5 ton unit could be the smallest available appliance made by the desired manufacturer. Current language would require a complete design change, such as utilizing a single appliance to serve the entire dwelling rather than the more desirable two-zone system, or requiring a system that utilizes electric baseboard heating and window-mounted air conditioning units. This is absurd, and an unfair to an owner that desires to reduce energy costs.

Cost Impact: none

M1401.3-RM-GRACE.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The text should be better defined with some calculations. The concept should be adapted for regional differences. The proposal should be reworked in a public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Richard Grace, Fairfax County Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1401.3 Equipment/appliance Sizing. Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S <u>or other approved sizing methodologies,</u> based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

> **Exception:** Heating and cooling equipment and appliance~~s~~ <u>sizing</u> shall not be limited to the capacities determined in accordance with Manual S <u>or other approved sizing methodologies,</u> where either of the following conditions apply:
>
> 1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with ~~Manual J~~ <u>the approved heating and cooling calculation methodology</u> are within the range of the manufacturer's published capacities for that equipment or appliance.
> 2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with ~~Manual J~~ <u>the approved heating and cooling calculation methodology</u> and the ~~manufacturer's~~ next larger standard size unit is specified.
> 3. ~~The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.~~

Commenter's Reason: After listening to the discussions presented during the Committee Action Hearings, we have incorporated those concerns within this modification. The first being the addition of "other approved sizing methodologies". ACCA's Manual S is not the ***only*** approved, appropriate sizing methodology available to size residential HVAC equipment. The current language would not permit other sizing methodologies such as ASHRAE's Handbook series. The second modification was to reword the language to provide clarity to the text. The third modification was to remove the third exception based on concerns voiced during testimony about the broad aspects that such an exception would permit.

The following is from the original reason statement:

Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Public Comment 2:

Luis Romeo Escobar, representing ACCA (Air Conditioning Contractors of America), requests Disapproval.

Commenter's Reason: The proposed exceptions to ACCA Manual S should be disapproved for the following reasons:

1. Variable refrigerant flow (VRF) technology is addressed in the revised Manual S. The committee that led the revision effort included representatives of VRF manufacturers. The new Manual S over size limits have been vetted by these committee members and is based on the available OEM expanded performance data. ACCA is following ICC procedures to ensure that the updated Manual S is the one referenced in the 2015 IRC and IECC.
2. Exceptions #2 and #3 are not based on sound technical grounds, but instead are contrived to benefit sales of a particular product class. This is specifically against the entire intent of Manual S and exactly what the industry needs to get away from.
3. The cost impact of this proposed change is not "none" as indicated by the proponents. Larger-than-necessary equipment will generally have higher initial costs (longer pay-back), higher energy costs due to constant cycling on-and-off of the

equipment, shortened equipment lifespan (again, due to the wear-and-tear of constant cycling), and will have higher maintenance costs if the proponents' example of two oversized units for one house is the case (homeowners are generally charged based on the number of units being serviced).

4. In the reasoning for item 3 the proponents state that a homeowner will see reduced energy costs by installing two oversized units as opposed to one properly sized unit – this patently absurd and unsubstantiated. The proponents, unfortunately not unlike many design practitioners, seem to think that installing two units is the only way to properly zone a home, which is not the case.
5. The main reason why the industry has a standard to avoid oversizing is in order to ensure that there is proper humidity control in the home. Severely oversized equipment does not stay on long enough for the coil to reach a low enough temperature for adequate moisture removal. This can result in the presence of mold and mildew, not to mention lead to an uncomfortable interior ambience (the dry-bulb temperature will be low, but the humidity high so it will feel clammy to the occupant). Clearly, this proposal would in no way makes a home safer, but instead puts the occupants in greater risk of developing serious health issues from the presence of moisture.
6. Manual S is not a suggestion, as the proponents erroneously purport. It is an industry developed, ANSI recognized standard that sets clear oversize limits that must be adhered to. While the old Manual S did have permissive language that may not have been adequately addressed by the directions on the inside cover, great care has been taken to ensure that the normative sections of the new Manual S are written in mandatory, enforceable language that is acceptable for the i-codes. It will undergo a second ANSI public review, during which anyone (proponents included) may submit a comment to correct any deficiencies.
7. Any exceptions to Manual S should be based on industry research, and not on personal anecdote. To date, no credible research has been produced that supports the claim that hugely oversized HVAC equipment is desirable or leads to a safer, more sustainable, more affordable, or more resilient home.
8. For situations in which the OEM expanded performance data is not available, the new Manual S provides a path for compliance in which the manufacturer certifies that the equipment meets the home's physical requirements.
9. Manual S already has procedures that allow for regional differences (the comparison of heating degree days to cooling degree days for qualification of different heat pump sizing limits).
10. One common problem that is used as justification for gross oversizing is that the specified OEM doesn't offer equipment with small enough capacity for the load requirements. Unfortunately, this will continue to be that case as long as the Manual S requirements are not enforced. This proposal is effectively asks code officials to compensate for a lack of OEM product offerings, which is not the purpose of the building codes (in fact, it will serve as a catch 22 that will prolong the same problem).

RM9-13

Final Action: AS AM AMPC____ D

RM21-13
M1411.3.3 (New)

Proposed Change as Submitted

Proponents: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Andrew Scott Jones, President, A Better Deal Heating and Air Conditioning, Inc., a Texas Corporation, representing himself.

Add new text as follows:

M1411.3.3 Drain Line Maintenance. Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

Reason:
(Hall-PMGCAC): This new language was approved for the 2015 IMC. Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic, crawlspace, closet, etc. The cut must be repaired by reconnecting the drain line with a PVC coupling and solvent cement.

This process exposes the surrounding area to water leakage and spilling with the risk of damage and mold, as well as the extra time and effort of carrying extra equipment, parts and flammable solvent. The repair process takes extra time and costs the homeowner more money.

(Jones): This language is identical to the language of M32-12 which was recently adopted in Portland, Oregon. We are advised by JB Engineering that this language will be in the IMC and IPC for 2015. There appears to be no reason not to accept this identical language in the IRC. Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic or closet where the drain is located, possibly collected in a bucket or soaked up with rags or paper towels. Then the technician blows compressed air through the drain line in both directions from the cut. The cut must be repaired by resealing the drain line with a PVC coupling and solvent.

This process exposes the surrounding area to water leakage and spilling with the risk of damage, mold, spilling, as well as the extra time and effort of carrying extra equipment, parts and flammable solvent. The process takes extra time and costs the homeowner more money.

With a device that permits the introduction of compressed air or nitrogen directly into the drain system permitting clearing in both directions, there is no spillage of water, no cost for the couplings or solvent and no risk of water damage or mold. The entire process requires less than ten minutes.

Typically the cost of clearing a drain equipped with such a device is at least 50% less to the homeowner than the cost of clearing a blockage through the common method of cutting the pipe, attempting to collect the condensate water and repairing the cut in the drain line.

Each time a drain line is cleared though the cutting/repair process, the repair could be accomplished by installing a $15.00 line clearing device rather than a simple coupling. Drain lines can also be plumbed without installing a device at the time of installation.

Also, if clearing the drain lines were part of regular maintenance, line blockages could largely be prevented in the first place.

Cost Impact:
(Hall-PMGCAC): The code change will increase the cost of construction.

(Jones): The code change will increase the cost of construction, totaling an estimated $15.00 per unit.

M1411.3.3 (NEW)-RM-HALL-PMGCAC-JONES.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal will increase the cost of construction and goes beyond the minimum code threshold. It is not costly to cut and repair the drain pipe. Cleanouts should be optional. Such drains can be cleaned from the terminal outlet end.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Andrew Scott Jones, A Better Deal Heating and Air Conditioning, Inc., representing self, requests Approval as Submitted.

Commenter's Reason: The Committee Stated in response to RM 21-13 that "The proposal will increase the cost of construction and goes beyond a minimum code threshold. It is not costly to cut and repair the drain pipe. Cleanouts should be optional. Such drains can be cleaned from the terminal outlet end." The comment incorrectly states that the terminal outlet end will work, as condensate drain lines need to be cleared in both directions. The new proposal can be complied with even without purchasing any piece of equipment, as the problem can be "plumbed around." There is a real problem with cutting clogged drain lines, as water can leak all over insulation, not to mention the time consumed in cutting, clearing the drain and repairing the cut with a collar. Eventually, the line will have to be replaced itself.

Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic or closet where the drain is located, possibly collected in a bucket or soaked up with rags or paper towels. Then the technician blows compressed air through the drain line in both directions from the cut. The cut must be repaired by resealing the drain line with a PVC coupling and solvent.

This process exposes the surrounding area to water leakage and spilling with the risk of damage, mold, spilling, as well as, the extra time and effort of carrying extra equipment, parts and flammable solvent. The process takes extra time and costs the homeowner more money.

With a device that permits the introduction of compressed air or nitrogen directly into the drain system, permitting clearing in both directions, there is no spillage of water, no cost for the couplings or solvent and no risk of water damage or mold. The entire process requires less than ten minutes.

Typically the cost of clearing a drain equipped with such a device is at least 50% less to the homeowner than the cost of clearing a blockage through the common method of cutting the pipe, attempting to collect the condensate water and repairing the cut in the drain line.

Each time a drain line is cleared through the cutting/repair process, the repair could be accomplished by installing a $15.00 line clearing device rather than a simple coupling. Drain lines can also be plumbed without installing a device at the time of installation.

Also, if clearing the drain lines were part of regular maintenance, line blockages could largely be prevented in the first place

Public Comment 2:

Vickie Lovell, INTERCODE, INC., representing Rectorseal, requests Approval as Submitted.

Commenter's Reason: The proponent disagrees with the committee that cleanouts for condensate lines should be optional for the following reasons:

1. Committee stated that the proposal will increase the cost of construction. Proponent agrees. The cost of a manual cleanout costs the owner about $15.00 at the time of equipment installation. However, the cost of the damage from a leak often goes beyond the cost of the repair, especially if the leak is undetected for some time.
2. Committee stated that it is not costly to cut and repair the drain pipe. Proponent disagrees. To call a professional and pay for a service call and repair and any other damage to the interior spaces is not inexpensive in comparison to the price of cleanout installed with the equipment.
3. Committee stated that such drains can be cleaned from the terminal outlet end. Proponent disagrees. This may or may not be easily accomplished depending on accessibility. In in a multi-story home, or a large single story home where multiple air conditioning units are tied into a common condensate line, a clog in the disposal line will cause water to back up into the drain pans of a lower unit tied into the condensate disposal line. This will occur even if all units are equipped with water-level detection devices due to the fact that the equipment on the lower level will shut down due to a backup, but the equipment on the higher level will continue to operate until water reaches the water-level detection device at that level.

The code does not prohibit drain piping to be cut, but it should. When a line is cut, there is the risk of an ineffective repair which exposes the owner to another leak, more damage, and another repair. A manual cleanout installed at the time of the HVAC equipment is a far superior, nominal-cost alternative to cutting a drain line which allows for removal of the clog within the line without cutting the condensate line to do so. These common-sense devices provide visual inspection that allows for viewing of the check valve and the flow of condensate.

Public Comment 3:

Stuart Oakner, representing MSD Research, Inc., requests Approval as Submitted.

Commenter's Reason: Condensate drain lines that are cut in order to be cleared have no guidelines on how to be joined back together therefore creating a situation in which the drain line may not meet the original code requirements on drain line installations. Cutting condensate drain lines that are filled with water lead to water and mold damage as there is not always enough space to catch water when the line is cut. There is not always room to cut drain lines as the initial installation does not call for drain clearing access, this can lead to the reconfiguring of the drain line to gain access which could create a new drain line that does not meet the original code requirements.

The terminal outlet of drains is not always accessible and even when it is it can lead to severe water damage by having to blow back into the drain line toward the already filled unit drain pan. The code language approved in the fMC, M32-12 states: Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut. Therefore this same language should be allowed in the IRC section RM21-13.

RM21-13

Final Action: AS AM AMPC____ D

RM22-13
M1411.4 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Guy McMann, Jefferson County Co., representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

Add new text as follows:

M1411.4 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

Reason:
(Hall-PMGCAC): Most condensate pumps are factory equipped with float switch controls for this purpose. This new text simply requires the switch to be utilized. Spaces such as attics and crawls are out of sight and out of mind, therefore condensate overflow will not be noticed until damage occurs. The overflow kill switch will shut off the equipment that produces the condensate before water damage can occur.

(McMann): This was approved in the Fuel Gas Code and the IMC. Pumps that are not connected in this fashion will permit the appliances to keep operating, spilling waste water where ever the appliance is located. When this condition continues over time, it could result in damage to building components or other property. This overflow condition may result in mold issues among other things. Most pump manufacturers already have this feature incorporated into the pump but the code does not require it to be connected. Damage as a result of not connecting this feature could prove to be very costly. This is not as much of a concern when appliances are readily accessible to occupants where leakage may be noticed in a timely manner.

Cost Impact: None

M1411.4 (NEW)-RM-HALL-PMGCAC-MCMANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal could cause a heating system to shut off in freezing weather resulting in freeze damage to piping.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Vickie Lovell, INTERCODE, INC. representing Rectorseal requests Approval as Submitted.

Commenter's Reason: The reason for disapproval from the RM Committee is not satisfactory. They stated that the approval of this "proposal could cause a heating system to shut off in freezing weather resulting in freeze damage to piping."

In reality, freeze damage to piping in the winter can occur for numerous reasons unrelated to condensation overflow. So, to NOT connect a condensate pump to an appliance, including those appliances that come with a condensate pump as part of the original equipment, for a reason that may not even occur seems very short-sighted, especially in climates where a hard freeze is not likely or even impossible to occur.

Most of the content of the codes is intended to be proactive to specifically prevent all kinds of unsafe conditions or costly problems. Condensation overflow can result in both unsafe and costly problems. It is a solvable problem that equipment and component manufacturers have recognized and provided homeowners with a solution. To not address this in the code is puzzling.

This proposal already approved during the Group A hearings and final action for the 2015 International Mechanical and Fuel Gas Codes, should also be approved in the 2015 residential mechanical requirements.

Public Comment 2:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: This change is needed for consistency with the IMC and IFGC which will both contain this text in the 2015 editions. The committee recommended disapproval because of the concern that a failed pump might turn off a condensing furnace or boiler and cause the house to freeze if the occupants were away for extended periods. This section would apply only to appliances located in out of sight spaces where condensate spillage would go unnoticed. A condensate pump safety shutoff switch is just one of many controls that can shut down a heating system and therefore adds little additional risk. Section M1411.4 would apply to electric and oil fired appliances only because Chapter 24 covers gas appliances and Chapter 24 will duplicate the same provision that will be in the 2015 IFGC.

RM22-13
Final Action: AS AM AMPC____ D

RM27-13
M1501.2 (New)

Proposed Change as Submitted

Proponent: Dan Buuck, representing National Association of Home Builders (NAHB) (dbuuck@nahb.org)

Add text as follows:

M1501.2 Transfer air. Air transferred from occupiable spaces, other than kitchens, bathrooms and toilet rooms, shall not be prohibited from serving as makeup air for exhaust systems. Transfer openings between spaces shall be of the same cross-sectional area as the free area of the makeup air openings. Where louvers and grilles are installed, the required size of openings shall be based on the net free area of each opening. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers have 25-percent free area and metal louvers and grilles have 75-percent free area.

Reason: The IMC contains language allowing makeup air to be provided from areas other than the room where the exhaust system is located (transfer air). It is just as important to clarify the allowable use of transfer air for exhaust systems in the IRC as it is in the IMC. Without this provision, Section M1503.4 can be interpreted that the total amount of makeup air is required to be introduced in the direct vicinity of the exhaust. This is not required in commercial construction, and so the IRC should be brought into alignment with the IMC in this area.

Most of the language is taken from existing sections of the code. They include: Transfer air: IMC Section 403; Transfer openings: Section M1602 Item 6; and Louvers and grilles: Section G2407.10.

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

M1501.2-RM-BUUCK.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed text is difficult to comprehend. Calculations should have been submitted to illustrate. The intent to state that outdoor air can be delivered to other than the kitchen is not clear.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**M1501.2 Transfer air.** Air transferred from occupiable spaces, other than kitchens, bathrooms and toilet rooms, shall not be prohibited from serving as makeup air for exhaust systems. Transfer openings between spaces shall be of the same cross-sectional area as the free area of the makeup air openings. Where louvers and grilles are installed, the required size of openings shall be based on the net free area of each opening. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers have 25-percent free area and metal louvers and grilles have 75-percent free area.~~

M1503.4.1 Location Kitchen exhaust makeup air shall be discharged into the same room in which the exhaust system is located or into rooms or *duct systems* that communicate through one or more permanent openings with the room in which such exhaust

<u>system is located. Such permanent openings shall have a net cross-sectional area not less than the required area of the makeup air supply openings.</u>

Commenter's Reason: The reason proposal RM27 on Transfer Air was disapproved by the committee in Dallas was that it felt the text was too complicated. This public comment would accomplish the same thing with language that better fits the IRC. The provision is also being relocated to the range hood section, because it is meant to deal solely with kitchen exhaust makeup air.

The concern driving this code change is that kitchen exhaust makeup air has only been a commercial concept until fairly recently. Makeup air in a commercial kitchen has very specific requirements which are not necessary in a residential setting. For example, the makeup air opening in a commercial kitchen needs to be located in the direct vicinity of the draft hood. Homeowners, however, have valid reasons for not wanting the opening in the kitchen, including comfort, practicality, and aesthetics. Locating the opening in another room or bringing the makeup air in through the duct system allows the unconditioned air to mix and temper which is vital in harsher climates. When these openings are required in the kitchen, there is a much greater possibility that they will be covered or otherwise disabled.

RM27-13

Final Action: AS AM AMPC____ D

RM31-13
202, M1503.4

Proposed Change as Submitted

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportventures.net)

Add new definitions as follows:

AIR, MAKEUP. Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration

AIR, OUTDOOR. Ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration.

AIR, TRANSFER. Air moved from one indoor space to another

INFILTRATION. Uncontrolled inward air leakage to conditioned spaces through unintentional openings in ceilings, floors, and walls from unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

EXFILTRATION. Uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors, and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

Revise text as follows:

M1503.4 Makeup air required. Kitchen ~~E~~exhaust ~~hood~~ systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not less than one motorized damper ~~a means of closure and~~ that shall be automatically controlled to ~~start and~~ operate simultaneously with the exhaust system.

> **Exception:** Intentional openings for makeup air are not required for kitchen exhaust systems capable of exhausting not greater than 600 cubic feet per minute provided that one of the following conditions is met:
>
> 1. Where the floor area within the air barrier of a dwelling unit is at least 1500 square feet, and where natural draft or mechanical draft space-or water-heating appliances are not located within the air barrier.
> 2. Where the floor area within the air barrier of a dwelling unit is at least 3000 square feet, and where natural draft space-or water-heating appliances are not located within the air barrier.

Reason: The language in 1503.4 is confusing and needs to be reworked. This proposal accomplishes the following. Detailed rationale follows the bullets.

1. Recognizes that makeup air (MUA) requirements are indifferent to the type of exhaust system (same MUA requirements should apply whether it's a hood, down draft, through the wall vent, or any other type)
2. Clarifies where MUA comes from (transfer and outdoor air), and updates definitions to align with IMC
3. Clarifies what type of MUA system should be specified (at a minimum, one motorized, automatically controlled damper)
4. Provides an exception to relax the MUA requirements where the home is assumed to have sufficient natural infiltration to minimize the chance of backdrafting for the combustion appliances within the air barrier.

First, the current language only addresses exhaust hood systems, but the physics of back drafting are indifferent as to whether the exhaust system is a hood, a down draft, a through the wall vent, or any other type of exhaust system. So, the word “hood” is removed to reflect this fact.

Second, several definitions from the 2015 IMC are inserted clarify how the MUA system operates – things like where the MUA comes from, where the air must be introduced, etc. These definitions are also aligned with ASHRAE 62.

Third, this change clarifies the minimum required component of a MUA system (at least one motorized damper). A motorized damper is required because gravity dampers can malfunction at the low pressure differentials at which naturally vented appliances can potentially back draft (i.e., 3-5 Pascals based on info from BPI, CMHC, and CAN/CSA F326-M91; see references below). Malfunction can occur through improper balancing and slight restrictions in the damper caused by dirt, debris, or other matter.

Fourth, MUA should not be required where the home is deemed sufficiently leaky to minimize the chance of backdrafting for the combustion appliances within the air barrier. This exception assumes that mechanical draft combustion appliances can be operated safely to a pressure of -15 Pascals, and that direct vent appliances can be operated safely to a pressure of -50 Pascals. It also assumes that the home has a leakage of 3 ACH 50 and that there is good pressure distribution throughout the home. Ceiling height is assumed to be 8.5 ft. Equations used to estimate building leakage at the pressures of -15 Pa and -50 Pa were sourced from 2009 ASHRAE Fundamentals 16.15 (equations 41, 43 assuming a pressure exponent of 0.65).

References:

• BPI (Building Performance Institute). *Technical Standards for the Building Analyst Professional*.
http://www.bpi.org/Web%20Download/BPI%20Standards/Building%20Analyst%20Professional_2-28-05nNC-newCO.pdf
• CAN/CSA F326-M91. *Residential Mechanical Ventilation Systems, A National Standard of Canada.* Reaffirmed 2010.
• CMHC (Canada Mortgage Housing Corporation). *Chimney Safety Tests Users Manual, Second Edition*. January 12, 1988.
http://publications.gc.ca/collections/collection_2011/schl-cmhc/nh18-1/NH18-1-61-1988-eng.pdf.
• Minnesota Mechanical and Fuel Gas Code 1346.0501.501.3.2. https://www.revisor.mn.gov/rules/?id=1346.0501.
• 2009 ASHRAE Handbook of Fundamentals.

Cost Impact: This proposal has the potential to reduce the cost of construction by adding exceptions for MUA requirements when a dedicated MUA system is not needed.

M1503.4#1-RM-MOORE.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Disapproval is based upon the preference for RM34 which allows a gravity damper. The proposed definitions are vague.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Submitted.

Commenter’s Reason: The committee disapproved this proposal in deference to RM34, which specifically approved gravity dampers for makeup air. Please cross reference my public comment on RM34 which explains why the committee got this one wrong, and why gravity dampers for makeup air are generally a bad solution that can pose a threat to life safety.

In keeping with the original intention of this section of the code, RM31 prohibits gravity dampers for kitchen exhaust makeup air. In addition to taking this measure to safeguard the life safety of occupants, RM31 introduces several improvements to this section that accomplish the following.

1. Recognizes that makeup air (MUA) requirements are indifferent to the type of exhaust system (same MUA requirements should apply whether it’s a hood, down draft, through the wall vent, or any other type)
2. Clarifies where MUA comes from (transfer and outdoor air), and updates definitions to align with IMC
3. Clarifies what type of MUA system should be specified (at a minimum, one motorized, automatically controlled damper)
4. Provides an exception to relax the MUA requirements where the home is assumed to have sufficient natural infiltration to minimize the chance of back drafting for the combustion appliances within the air barrier.

Detailed rationale for the previous four bullets is as follows:

First, the current language only addresses exhaust hood systems, but the physics of back drafting are indifferent as to whether the exhaust system is a hood, a down draft, a through the wall vent, or any other type of exhaust system. So, the word “hood” is removed to reflect this fact.

Second, several definitions from the 2015 IMC are inserted to clarify how the MUA system operates – things like where the MUA comes from, where the air must be introduced, etc. These definitions are also aligned with ASHRAE 62, and are important because they provide code officials, builders, and contractors with a better understanding and terminology for MUA.

Third, this change clarifies the minimum required component of a MUA system (at least one motorized damper). A motorized damper is required because gravity dampers can malfunction at the low pressure differentials at which naturally vented appliances can potentially back draft (i.e., 3-5 Pascals based on info from ACCA Manual D, BPI, CMHC, and CAN/CSA F326-M91; see references below). Malfunction can occur through improper balancing and slight restrictions in the damper caused by dirt, debris, or other matter.

Fourth, MUA should not be required by a minimum code when the home is deemed sufficiently leaky to minimize the chance of back drafting for the combustion appliances within the air barrier. This exception assumes that mechanical draft combustion appliances can be operated safely to a pressure of -15 Pascals, and that direct vent appliances can be operated safely to a pressure of -50 Pascals. It also assumes that the home has a leakage of 3 ACH 50 and that there is good pressure distribution throughout the home. Ceiling height is assumed to be 8.5 ft. Equations used to estimate building leakage at the pressures of -15 Pa and -50 Pa were sourced from 2009 ASHRAE Fundamentals 16.15 (equations 41, 43 assuming a pressure exponent of 0.65).

References:

- ACCA. 2009. *Residential Duct Systems. Manual D*. Air Conditioning Contractors of America. Washington, DC.
- BPI (Building Performance Institute). *Technical Standards for the Building Analyst Professional*. http://www.bpi.org/Web%20Download/BPI%20Standards/Building%20Analyst%20Professional_2-28-05nNC-newCO.pdf
- CAN/CSA F326-M91. *Residential Mechanical Ventilation Systems, A National Standard of Canada.* Reaffirmed 2010.
- CMHC (Canada Mortgage Housing Corporation). *Chimney Safety Tests Users Manual, Second Edition*. January 12, 1988. http://publications.gc.ca/collections/collection_2011/schl-cmhc/nh18-1/NH18-1-61-1988-eng.pdf.
- Minnesota Mechanical and Fuel Gas Code 1346.0501.501.3.2. https://www.revisor.mn.gov/rules/?id=1346.0501.
- 2009 ASHRAE Handbook of Fundamentals.

RM31-13

Final Action: AS AM AMPC____ D

RM33-13
M1503.4

Proposed Change as Submitted

Proponent: Dan Buuck, National Association of Home Builders (NAHB) (dbuuck@nahb.org)

Revise as follows:

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of ~~400~~ 600 cubic feet per minute (0.19 m^3/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Reason: The threshold for makeup air was originally set at 400 cfm, because it was believed that most residential kitchen exhaust systems fall below that number. Many down-draft exhaust systems, however, are rated between 400 and 600 cfm, penalizing homeowners who prefer these systems by adding a lot of cost and complexity to their homes. Everyone can agree that there are certain 'monster' exhaust hoods (e.g. 1200 cfm) that need makeup air, but the current threshold is set too low.

The PMG CAC supported this change for the IMC during the Group A Final Action Hearings.

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

M1503.4-RM-BUUCK.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed increase to 600 cfm will increase the possibility of depressurization that could result in CO poisoning. The proposed text requires makeup air for the entire exhaust rate, as opposed to just the amount that is in excess of 400.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting ~~in excess of 600~~ more than 400 cubic feet per minute (0.19 m^3/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate that is in excess of 400 cubic feet per minute. Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

> **Exception:** Where all appliances in the house are direct-vent, power-vent, unvented, or electric, makeup air shall be provided where exhaust fans are capable of exhausting more than 600 cubic feet per minute (0.28 m^3/s). Exhaust hood systems capable of exhausting more than 600 cubic feet per minute shall be provided with makeup air at a rate approximately equal to the exhaust air rate that is in excess of 600 cubic feet per minute.

Commenter's Reason: As originally written in the 2009 IRC, this section allows range hoods up to 400 cfm to be installed without makeup air. It would be consistent to require makeup air equaling the amount above and beyond 400 cfm for larger fans. Essentially, there would be no difference between the effect a 400 cfm fan has on a house and a 600 cfm fan with 200 cfm of makeup air. This would also improve the feasibility and acceptance of this code section as well as cut down on the amount of wasted energy and potential occupant discomfort caused by needlessly introducing excessive amounts of unconditioned air.

Currently this section of the code does not take into effect the difference between homes where all appliances in the home are of sealed combustion, power-vent, unvented or electric, power and those which contain one or more naturally vented appliances. Because the potential for appliance back drafting is greatly reduced where naturally vented appliances are not present, the 400 cfm threshold can be raised to 600 cfm where only sealed combust ion, power-vent, unvented, or electric, power appliances are used in the dwelling. This would allow for the use of more effective, common residential 500 to 600 cfm down-draft exhaust fans without the need to unnecessarily add makeup air.

RM33-13

Final Action: AS AM AMPC____ D

RM34-13
M1503.4

Proposed Change as Submitted

Proponent: Dan Buuck, National Association of Home Builders (NAHB); David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m^3/s) shall be <u>mechanically or naturally</u> provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with ~~a~~ <u>not less than one damper. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates</u> ~~means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.~~ <u>Dampers shall be accessible for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced.</u>

Reason: The first change adds the words 'mechanically or naturally'. It is important to explicitly state that both mechanical ventilation (i.e. a fan) and natural ventilation (i.e. a passive opening) is allowed by this provision for the following reasons. First of all, It is not being interpreted the same in all jurisdictions. Secondly, there is no precedence for mechanical makeup air in the IRC.
The second change deals with the type of damper that is allowed. The only reason to require a 'means of closure' to the makeup air system is to limit the amount of conditioned air that leaves the building when the exhaust is not running. Both electrically-operated and gravity dampers achieve this goal, and it is important to clarify that both are allowed. Again, it is not being interpreted the same in all jurisdictions. (Some are allowing gravity dampers, but not all.) Secondly, allowing a gravity damper is in keeping with similar applications within the IRC—nowhere are automatic (motorized) dampers required for makeup or ventilation air. Finally, a gravity damper has the added benefit of equalizing depressurization in the house for any other reason (e.g. bath fans and clothes dryers).
The last sentence was taken and modified from Section M1305.1 on appliance access. It emphasizes that both types of dampers, gravity and motorized, require maintenance and may need to be replaced at some time.

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

M1503.4-RM-BUUCK-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. Running the exhaust fan at less than full speed will allow the gravity damper to open partially, thereby limiting the entry of outdoor air.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Disapproval.

Commenter's Reason: This was not approved by the mechanical committee. Sustaining the committee action will only cause confusion and inconsistent enforcement. Not striking the word "hood" does not capture downdraft systems. Gravity dampers are unreliable as everything affects them. They are subject to pressure differentials' that renders them unreliable. Running the fan at lower speeds does not assure the damper will partially open if at all as one committee member stated. Gravity dampers will permit unwanted air to come in under many conditions when the fan is not operating that will be very undesirable in hot humid locations and in cold climates. The point of the original text was to make sure the damper in only open when the fan is operating, *not when the wind is blowing*. This can only be achieved with an electrically powered damper and will be much more effective.

Public Comment 2:

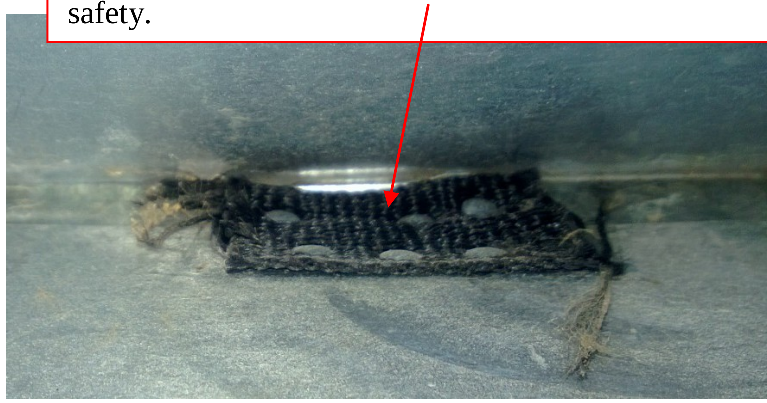
Mike Moore, Newport Ventures, representing Broan-NuTone, requests Disapproval.

Commenter's Reason: In its current form, M1503.4 does not permit gravity dampers to be used in makeup air systems, and for good reason. Makeup air dampers must be able to operate at very low depressurization levels to ensure that combustion appliances like water heaters and furnaces do not back draft when a large range hood is operating. For example, Appendix 14 of ACCA Manual D states, "Properly vented combustion equipment can back draft when the space pressure is as small as -1 to -5 Pascals."

Unfortunately, gravity dampers for residential applications are rarely provided with data on the minimum depressurization level required for them to open.* Without consistent data on operation of gravity dampers as a function of depressurization, and with no code requirements for the minimum depressurization level at which gravity dampers must operate, approving gravity dampers could introduce a life safety risk in tight homes with combustion appliances and large kitchen exhaust systems; therefore, this proposal should be disapproved.

**To determine what data are available on non-motorized damper operation (e.g., "gravity", "static pressure regulating", "fresh air intake", "barometric", "pressure relief" etc.), we reviewed the installation manuals of 30 products from 7 manufacturers that are available through the nation's largest HVACR distributor's website. Of these, only 7 products were provided with data on the pressure differential at which the damper would begin to open, with an average of 17 Pascals across the products with published data. This cut-in operation pressure is over 3 times the recommended depressurization limit for combustion appliances according to ACCA!*

Here's an example of a gravity damper that would be approved if RM34 is approved. Can you guess what depressurization level is required to open this damper? If you don't know the answer, then RM34 should be disapproved.



Images: Contractor-made gravity damper that came off a single family home built in 2000. Notice the canvas hinge (picture on right) attached with rivets (shown on left). It's clever, but I wouldn't count on it for life safety.

RM34-13

Final Action: AS AM AMPC____ D

RM35-13
M1503.4

Proposed Change as Submitted

Proponent: Guy McMann, MCP, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

Revise as follows:

M1503.4 Makeup air required. Kitchen exhaust ~~hood~~ systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. ~~Such~~ Gravity or mechanical makeup air systems shall be equipped with a motorized means of closure and shall be automatically controlled to ~~start and~~ operate simultaneously with the exhaust system

Reason: This proposal clarifies that the makeup air systems may be mechanical or gravity depending on the designer's preferences. This also clarifies that in either case, a motorized damper will be required to ensure a positive means of closure. Striking the word "hood" captures downdraft equipment which could be construed as not being included.

Cost Impact: None

M1503.4-RM-MCMANN.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: Motorized dampers should not be the only option. The term "naturally" implies infiltration which is inappropriate. One remedy can't cover all conditions.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1503.4 Makeup air required. Kitchen exhaust systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. ~~Gravity or mechanical~~ ~~m~~Makeup air systems shall be equipped with not less than one ~~a~~ motorized damper ~~means of closure and~~ that shall be automatically controlled to operate simultaneously with the exhaust system.

Commenter's Reason: The committee made a mistake at the Dallas hearings in approving gravity dampers for makeup air. This change is needed to clarify that gravity dampers are not an appropriate solution for makeup air for the following reasons:

1. The pressure differentials at which combustion appliances are expected to back draft are very low (-1 to -5 Pascals; -0.004 to -0.020 inches of water column)*, and code officials have no guarantee that gravity dampers will work at these low depressurization levels required to avoid back drafting of combustion appliances.
2. Few manufacturers provide any data on operation of gravity dampers, and where provided, results typically show that the gravity dampers do not open at the low depressurization levels required to avoid back drafting of combustion appliances.**

3. The original intention of this section was to require motorized dampers, as per conversation with the original proponent of M1503.4 in an ICC PMG CAC committee conference call on June 4, 2013.

* *Appendix 14 of ACCA Manual D states, "Properly vented combustion equipment can back draft when the space pressure is as small as -1 to -5 Pascals."*
***To determine what data are available on non-motorized damper operation (e.g., "gravity", "static pressure regulating", "fresh air intake", "barometric", "pressure relief" etc.), we reviewed the installation manuals of 30 products from 7 manufacturers that are available through the nation's largest HVACR distributor's website. Of these, only 7 products were provided with data on the pressure differential at which the damper would begin to open, with an average of 17 Pascals across the products with published data. This cut-in operation pressure is over 3 times the recommended depressurization limit for combustion appliances according to ACCA Manual D!*

RM35-13
Final Action: AS AM AMPC____ D

RM36-13
M1506, M1507, and Chapter 44

Proposed Change as Submitted

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportventures.net)

Revise as follows:

M1506.1 Duct~~s~~ construction. Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

M1506.2. Duct length. The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.

> **Exception:** Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

M1506.~~2~~3 Exhaust openings. Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

TABLE M1506.2
DUCT LENGTH

Duct Type	**Flex Duct**								**Smooth-Wall Duct**							
Fan Airflow Rating CFM @ 0.25 in. wc[1]	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Diameter[2] in.	Maximum Length[3,4,5] ft.															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

1. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

2. For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
3. This table assumes that elbows are not used. Fifteen feet (5 m) of allowable duct length shall be deducted for each elbow installed in the duct run.
4. NL = no limit on duct length of this size.
5. X = not allowed, Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

M1507.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

M1507.2 Flow Rate Verification. The flow rate for ventilating equipment shall be verified in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or the flow rate shall be verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

Add new standard to Chapter 44 as follows:

ANSI/AMCA 210-ANSI/ASHRAE 51-07, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

Reason: Section M1507 establishes the minimum design flow rates required for local exhaust and whole house mechanical ventilation (WHMV) fans. However, field tests of ventilating fans often show that actual flow rates fall short of design. Failure of fans to meet design rates can generally be attributed to one of two reasons: either the ductwork is poorly matched to the fan, or the fan's actual airflow does not match its label (i.e., has not been verified via a standardized laboratory test). By providing a prescriptive duct sizing table, this proposal takes the guess work out of whether a fan should operate per the design rate. By requiring that either the fan flow rate be verified by the manufacturer in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or be field verified by the installer or approved third party, this proposal provides a minimum level of quality assurance and control to the installation of ventilation fans.

The proposed table is taken directly from ASHRAE 62.2-2010, addendum F. Confirmation that a ventilation fan's flow rate is in compliance with ANSI/AMCA 210-ANSI/ASHRAE 51 is as simple as looking for an HVI sticker in the fan housing. Ventilating fans exceeding the maximum CFM in Table M1506.2 would comply with Section M1506.2 by using the exception (i.e., installing ducts in accordance with the manufacturer's design criteria or by field confirmation of the flow rate).

Cost Impact: Incremental costs associated with this proposal are expected to be minimal to zero, since this proposal reflects the minimum design practice needed to ensure that installed rates match design rates.

Analysis: A review of the standard proposed for inclusion in the code, [ANSI/AMCA 210-ANSI/ASHRAE 51-07] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

M1506.2 (NEW)-RM-MOORE.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The table is confusing as it appears that smooth-wall ducts are not allowed to be longer than flex ducts. Verification of flow rates will be difficult for code officials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Mike Moore, P.E., Newport Ventures, representing Broan-NuTone requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION M1506
EXHAUST DUCTS AND EXHAUST OPENINGS

M1506.1 Duct construction. Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

~~**M1506.2. Duct length**. The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.~~

> ~~**Exception:** Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.~~

~~**M1506.3**~~ **M1506.2 Exhaust openings.** Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

M1507.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

M1507.2 Flow Rate Verification. ~~The flow rate for~~ Ventilating equipment shall be ~~verified~~ listed and labeled in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51, or the flow rate of the installed system shall be verified by the installer or an approved third party using a flow hood, flow grid, or other airflow measuring device.

~~TABLE M1506.2~~
~~DUCT LENGTH~~

~~**Duct Type**~~	~~**Flex Duct**~~								~~**Smooth Duct**~~							
~~**Fan Airflow Rating** CFM @ 0.25 in. wg[1]~~	~~50~~	~~80~~	~~100~~	~~125~~	~~150~~	~~200~~	~~250~~	~~300~~	~~50~~	~~80~~	~~100~~	~~125~~	~~150~~	~~200~~	~~250~~	~~300~~
~~**Diameter[2] in.**~~	~~Maximum Length[3,4,5] ft.~~															
~~3~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~5~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
~~4~~	~~56~~	~~4~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~114~~	~~31~~	~~10~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
~~5~~	~~NL~~	~~81~~	~~42~~	~~16~~	~~2~~	~~X~~	~~X~~	~~X~~	~~NL~~	~~152~~	~~91~~	~~51~~	~~28~~	~~4~~	~~X~~	~~X~~
~~6~~	~~NL~~	~~NL~~	~~158~~	~~91~~	~~55~~	~~18~~	~~1~~	~~X~~	~~NL~~	~~NL~~	~~NL~~	~~168~~	~~112~~	~~53~~	~~25~~	~~9~~
~~7~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~161~~	~~78~~	~~40~~	~~19~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~148~~	~~88~~	~~54~~
~~8 and above~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~189~~	~~111~~	~~69~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~NL~~	~~198~~	~~133~~

1. ~~Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.~~
2. ~~For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.~~

3. ~~This table assumes no elbows. Deduct 15 feet (5 m) of allowable duct length for each elbow.~~
4. ~~NL = no limit on duct length of this size.~~
5. ~~X = not allowed, any length of duct of this size with assumed turns and fitting will exceed the rated pressure drop.~~

CHAPTER 44
REFERENCED STANDARDS

Add new standard as follows:

ANSI/AMCA 210-ANSI/ASHRAE 51, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

Commenter's Reason: This proposal is intended to ensure that ventilating fans are factory or field tested to achieve minimum ventilation flow rates. By requiring that either the fan flow rate be listed and labeled in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or be field verified by the installer or approved third party, this proposal provides a minimum level of quality assurance and control to the specification of ventilating fans.

After receiving committee input in Dallas, this public comment improved upon the original proposal by making the following changes:

- Removed the maximum duct length table, which the committee found to be confusing
- Removed reference to "exhaust and supply" ducts, since this section only applies to exhaust ducts.
- Inserted clarification for code officials that fans shall be "listed and labeled" in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51. Listing and labeling of these products is currently maintained by the Home Ventilating Institute.

The Home Ventilating Institute is an example of an organization that for the past 4 decades has maintained a list of ANSI/AMCA 210-ANSI/ASHRAE 51 compliant range hoods and fans for bathrooms and toilet rooms in its certified products directory, which is freely available to the public (http://www.hvi.org/proddirectory/index.cfm) and contains over 3000 listings. For fans that are HVI certified to ANSI/AMCA 210-ANSI/ASHRAE 51, confirmation that the flow rate is in compliance with ANSI/AMCA 210-ANSI/ASHRAE 51 is as simple as looking for an HVI sticker in the fan housing.

Public Comment 2:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1506.1 Duct construction. Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

M1506.2. Duct length. The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.

> **Exception:** Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

M1506.3 Exhaust openings. Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

TABLE M1506.2
DUCT LENGTH

Duct Type	**Flex Duct**								**Smooth-Wall Duct**							
Fan Airflow Rating CFM @ 0.25 in. wc[1]	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Diameter[2] in.	Maximum Length[3,4,5] ft.															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

1. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.
2. For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
3. This table assumes that elbows are not used. Fifteen feet (5 m) of allowable duct length shall be deducted for each elbow installed in the duct run.
4. NL = no limit on duct length of this size.
5. X = not allowed, Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

M1507.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

~~**M1507.2 Flow Rate Verification**. The flow rate for ventilating equipment shall be verified in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or the flow rate shall be verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.~~

ANSI/AMCA 210-ANSI/ASHRAE 51-07, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

Commenter's Reason: The committee felt that verifying the flow rate would be difficult for code enforcement personnel. The only other concern was with the table which was printed such that it was hard to read in the original proposal.

The committee reason for recommending disapproval was based on the fact that the proposed table was printed with some numbers offset such that it was difficult to read. They also felt that the code official would not be able to verify the fan flow rates. Fans are labeled by HVI which demonstrates that the fan flow rate specified by the manufacturer is accurate. The offset numbers in the table have been corrected as shown in this public comment. Without this text, exhaust fans will continue to be installed with ducts that will not allow the fan to reach its intended flow rate. A 50 cfm fan with high resistance ductwork might exhaust only a small fraction of the 50 cfm. Installing the proper size fan is pointless if the proper size and length of ductwork is not connected to it.

RM36-13

Final Action: AS AM AMPC____ D

RM37-13, Part I
202, M1506.2

Proposed Change as Submitted

THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IRC-PLUMBING AND MECHANICAL COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportventures.net)

PART I - IRC MECHANICAL

Add new definition as follows:

<u>**ENVIRONMENTAL AIR.** Air that is conveyed to or from occupied areas through ducts that are not part of the heating or air-conditioning system, such as ventilation for human usage, domestic kitchen range exhaust, bathroom exhaust and domestic clothes dryer exhaust.</u>

Revise text as follows:

M1506.2 Exhaust openings. ~~Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake.~~ Openings shall comply with Sections R303.5.2 and R303.6.

Cost Impact: No impact.

M1506.2-RM-MOORE.DOC

Committee Action Hearing Results

PART I – IRC – Mechanical
Committee Action: **Approved as Submitted**

Committee Reason: The proposed text is consistent with the IMC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Disapproval.

Commenter's Reason: It makes perfect sense for exhaust requirements to be located in the exhaust chapter. This requirement was installed in this chapter a few cycles ago and is a convenient location for the user.

Public Comment 2:

Paul Rimel, City of Staunton, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: RM37 is presented as a two-part proposal but approval of one part without the other would duplicate or completely remove the separation requirements for environmental exhaust.

If Part I is disapproved and Part II is approved, the separation requirements will exist in both M1506.2 and R303.5.2 and this would add unnecessary language to the code.

If Part I is approved and Part II is disapproved, the text that's been deleted in Part I won't exist in R303.5.2.

There are at least two important reasons Part II should not be approved, so the consequences of approving Part II should be carefully evaluated prior to voting in support of Part I.

RM37-13, Part I

Final Action: AS AM AMPC____ D

RM37-13, Part II
R303.5, R303.5.1, R303.5.2

<u>Proposed Change as Submitted</u>

THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IRC-PLUMBING AND MECHANICAL COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportventures.net)

PART II - IRC BUILDING

R303.5 Opening location. Outdoor intake and exhaust openings shall be located in accordance with Sections R303.5.1 and R303.5.2.

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant <u>source</u>, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a ~~source of~~ contaminant <u>source</u> is located within 10 feet (3048 mm) of an intake opening, such opening shall be located not less than 3 feet (914 mm) below the contaminant source. For the purpose of this section, <u>environmental air other than domestic clothes dryer exhaust</u> ~~the exhaust from *dwelling* unit toilet rooms, bathrooms and kitchens~~ shall not be considered as hazardous or noxious.

R303.5.2 Exhaust openings. Exhaust air shall not be directed onto walkways. <u>Air exhaust openings shall terminate not less than: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building; and 10 feet (3048 mm) from mechanical air intakes except where the exhaust opening is located not less than 3 feet (914 mm) above the air intake.</u>

> <u>**Exception**: The minimum termination distances from the building's operable openings, nonoperable openings, and mechanical air intakes shall not be required where the exhaust source is environmental air other than domestic clothes dryer exhaust.</u>

Reason: The language on exhaust and intake openings is redundant and confusing in that it is spread throughout the code, and permits exhausts to be located near intakes but does not permit intakes to be located near exhausts. This change seeks to simplify the language, reorganize into one section, and ensure that the allowances for intakes are consistent with the allowances for exhaust. Improvements include the following:

1. Include exhaust from occupied areas among the list of non-hazardous exhaust. R303.5.1 states that exhaust from toilet rooms, bathrooms, and kitchens shall not be considered as hazardous. This list is not comprehensive, notably excluding exhaust from occupied areas like living rooms or bedrooms, which are likely to contain even less contaminants than exhaust from toilet rooms, bathrooms, and kitchens. To fix this, I've borrowed the definition of "Environmental Air" from the IMC and excluded clothes dryer exhaust and parking garage exhaust, since this section does not currently permit these.
2. Move the text of M1506.2 to R303.5.2, and reduce the text of M1506.2 to a reference.
3. Add an exception to R303.5.2 that aligns with the language in R303.5.1. To simplify, the code currently states that A can be close to B, but B can't be close to A, which doesn't make sense. R303.5.1 specifically eliminates the minimum separation distance between intakes and exhaust terminations of toilet rooms, bathrooms, or kitchens. However, M1506.2 still states that all exhaust terminations must still observe minimum separation distances from intakes. Adding the exception to R303.5.2 brings consistency to these two sections.

Cost Impact: No impact.

M1506.2-RM-MOORE.DOC

Committee Action Hearing Results

PART II – IRC – Building
Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. The proposed text provides design flexibility for exhaust outlet locations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Disapproval.

Commenter's Reason: It makes perfect sense for exhaust requirements to be located in the exhaust chapter. This requirement was installed in this chapter a few cycles ago and is a convenient location for the user.

Public Comment 2:

Paul Rimel, City of Staunton, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: This proposal would radically change the current requirements by permitting zero separation from domestic range and bathroom exhaust to both mechanical and gravity intake openings. The exception to R303.5.2 would literally allow an exhaust outlet from a kitchen or bathroom to be directly adjacent to a mechanical air intake or operable/nonoperable opening with no vertical separation required between the two. As a point of reference, Section 501.3.1 (#3) of the 2012 IMC has the same separation distances as the text being relocated from M1506.2 to R303.5.2 however, the IMC has no exception because those distances are intended to apply to all environmental exhaust outlets without any further reduction. This exception has never appeared in any ICC code previously and it should not be added now.

Just because the exhaust from a range hood or bath fan isn't considered hazardous or noxious, that doesn't mean the minimum distance from a mechanical air intake should change from 10 feet horizontal (or 3 feet vertical) to zero or, that the minimum distance from an operable or nonoperable opening should change from 3 feet (either horizontally or vertically) to zero.

The 4'th sentence of bullet point #3 in the reason statement is misleading in that it states "M1506.2 still states that all exhaust terminations must still observe minimum separation distances from intakes." M1506.2 has been reduced to no more than a reference but more importantly, the text moved from there to R303.5.2 now includes a brand new exception that completely eliminates all separation requirements for domestic range and bath fan exhausts!

Additionally, Part I of this proposal includes domestic clothes dryer exhaust in the definition of environmental air but Part II excludes dryer exhaust from the less stringent separation requirements that apply to other non-hazardous exhaust terminations. If clothes dryer exhaust is not hazardous or noxious by definition, then why should it be subject to more restrictive separation distances than other types of environmental exhaust? The new text in the last sentence of R303.5.1 "<u>environmental air other than domestic clothes dryer exhaust</u>" implies that dryer exhaust is hazardous or noxious which would likely cause many users of the code to incorrectly apply the more stringent requirements of R303.5.1 to clothes dryer exhaust instead of the correct but somewhat obscure requirements located in M1502.3. This is especially true for those who support the popular notion that all intake/exhaust requirements should be consolidated into a single location in Chapter 3.

In the majority of cases, it would be very difficult to terminate a clothes dryer exhaust at least 10 feet horizontally or 3 feet vertically from all building openings in conventional residential construction and the common practice of terminating through a ground floor band board would be virtually eliminated in houses without basements due to the proximity of nearby crawlspace vents. There is no precedent in the code that deems domestic clothes dryer exhaust to be hazardous or noxious and the proponent has offered no reason or supporting data that indicates dryer exhaust should be treated any differently than other types of environmental air. This is obviously not the intent of the definition proposed in Part I since that definition makes no such distinction.

RM37-13, Part II
Final Action: AS AM AMPC____ D

RM38-13
M1506.2

Proposed Change as Submitted

Proponent: Mike Winkler, Chair of the IRC Interpretations Committee, representing our committee

Revise as follows:

M1506.2 ~~Exhaust openings~~. Location of exhaust outlets. ~~Air~~ Exhaust air- ~~openings~~ outlets shall terminate not less than 3 feet (914mm) from property lines. Exhaust air outlets shall terminate not less than 3 feet from ~~operable and non-operable~~ openings that have the potential for allowing exhaust air back into the building, except where the exhaust air outlet is located not less 3 feet (914mm) above such openings. ~~and~~ Exhaust air outlets shall terminate not less than 10 feet (3048mm) from mechanical air intakes, except where the exhaust air outlet ~~opening~~ is located not less than 3 feet (914mm) above the mechanical air intake.

Reason: The IRC interpretation committee is attempting to revise the language for two reasons. First, to have the title be consistent with the IMC and second, to clarify the intent. The IRC interpretation committee received a request for a formal interpretation and could not reach a consensus regarding what exactly the current text requires. A "non-operable" opening could be viewed as a fixed louver or as a fixed glass window panel. Neither can be operated but one will let air into the building and the other will not.

The text is also revised so that the terms "opening" and "exhaust air outlet" are used consistently throughout the section. The current text stated *opening* where it meant *exhaust outlet* near the end of the 1st sentence. The exhaust outlets are now clearly distinct from the "openings", since "opening" in this context refers to air intake openings. The current text stated that exhaust openings had to be exactly 3 feet above the air intake, so, if it was 4 feet above, the allowance would not apply. The text was poorly formatted in a long run-on sentence which made it unclear if the exception for being 3 foot above applied only to the mechanical air intakes or if it also applied to other openings that could let exhaust back into the building. Breaking the run-on sentence into separate thoughts makes it perfectly clear that it applies in both cases. The proposed revisions mean to clarify what the interpretation committee believes to be the actual intent of this section, as well improve to readability of the text overall.

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

M1506.2-RM-WINKLER.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Approval of RM37 Parts I and II makes this proposal unnecessary.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1506.2 Location of exhaust openings. Exhaust air outlets shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from air intake openings into the building, including doors, louvers and grilles and operable windows.

3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where the exhaust air outlet is located not less than 3 feet (914 mm) above the mechanical air intake opening.

~~**M1506.2 Location of exhaust outlets.** Exhaust air outlets shall terminate not less than 3 feet (914mm) from property lines. Exhaust air outlets shall terminate not less than 3 feet from openings that have the potential for allowing exhaust air back into the building, except where the exhaust air outlet is located not less 3 feet (914mm) above such openings. Exhaust air outlets shall terminate not less than 10 feet (3048mm) from mechanical air intakes, except where the exhaust air outlet is located not less than 3 feet (914mm) above the mechanical air intake.~~

Commenter's Reason: The committee disapproved RM38 because they thought that RM37 accomplished the same thing and they approved RM37. However, RM38 intended to clarify what is meant by "operable and non-operable" openings and RM37 did not do this. RM38 is needed regardless of what happens to RM37, as they have different intents.

By approving this proposal as modified, the structure of the language within R303.5.2 is improved and clarified, and the requirement that prohibits exhaust terminals from being located near inoperable windows is removed.

RM38-13

Final Action: AS AM AMPC____ D

RM39-13
M1506.3 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Add new text as follows:

M1506.3 Exhaust fans. Exhaust fans shall not discharge through common ducts.

Reason: Some installers attempt to join the outlets of two or more bathroom exhaust fans into a common discharge duct. This presents multiple problems including: 1) The common duct is typically undersized which prevents the fans from achieving their intended flow rate. 2) The backdraft dampers in such fans are not designed to be airtight or to prevent reverse flow from other fans. The result is that discharge from one fan is pushed back through any fan that is not operating. 3) The fan manufacturers provide no guidance for this nor do they recommend the practice. 4) The tees used for such arrangements often create flow resistance and direct the flow such that the air streams oppose each other. 5) If fans in different dwelling units were joined to a common duct, there would be direct communication between the two dwellings.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M1506.3 (NEW)-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

M1506.3 Exhaust fans. The discharge from two or more exhaust fans shall not be combined in a common duct.

Committee Reason: Approval was based upon the proponent's published reason. The modification clarifies that a central fan with multiple inlets is allowed. The intended prohibition is the connecting together of the discharge side of 2 or more fans. As modified, the proposal will not increase the number of roof penetrations.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: This new code section will remove a perfectly acceptable design system that has not been proven to be a problem either in the past or the present. When a system is designed properly (duct sizing, fittings, and backdraft dampers), all of the problems associated with the original proponents reason statement are eliminated. The way to prevent problems associated with an installation is not to eliminate the option for the design, but to educate the installer as to the design criteria during the inspection process.

Additionally, if this language is approved, it will eliminate the ability to provide one common opening through the exterior of a dwelling unit for exhaust, or more simply put, require many additional openings to be cut into the exterior envelope, ensuring additional energy waste associated with this installation.

The CAH proposal for this code change stated that the following for the cost impact: “The code change proposal will not increase the cost of construction.” What this statement failed to include was what the cost impact would be to the homeowner after requiring multiple holes to be installed in their thermal envelope rather than only one hole, or what additional heat losses and gains are associated with these “holes”, and the cost impact on the HVAC equipment meant to offset this requirement. There WILL be a cost associated with this requirement.

RM39-13

Final Action: AS AM AMPC____ D

RM40-13
M1507.3

Proposed Change as Submitted

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com)

Add new text as follows:

M1507.3 Sound Ratings. Ventilation fans shall have a sound performance in accordance with the following:

1. For whole-house or continuous ventilation fans: maximum of 1.0 sone.
2. For intermittent local exhaust fans: maximum of 3.0 sone.

Exceptions:

1. Fans having a maximum rated airflow exceeding 400 cfm.
2. HVAC air handlers and fans mounted with not less than 4 ft (1 m) of ductwork between the fan and the intake grille.

(Renumber subsequent sections.)

Reason: Ventilation fans only work when they're turned on, and the number one reason typically given by home owners for not turning on a ventilation fan is, "it's too noisy".[1,2,3] As homes have become tighter, the use of whole house mechanical ventilation (WHMV) for maintaining acceptable indoor air quality and local exhaust fans to capture and expel pollutants at their source (esp. in bathrooms and kitchens) has become necessary. Installing a fan that will not be operated due to noise is a disservice to the homeowner, a liability to their health, and a risk to the home's durability (can lead to excess condensation on windows, increased potential for mold and rot, etc.).

This proposed requirement mirrors that adopted by the state of California and ASHRAE 62.2. Maximum sone levels have been enforced by Washington State's code since the late 1980s. The sone values proposed above have been widely accepted by the industry. A sone is linear measure of loudness, meaning that a three sone fan is three times as loud as a one sone fan. The Home Ventilating Institute describes the sone scale as follows:

- 0.5 sone: rustling leaves
- 1.0 sone: refrigerator
- 3.0 sone: typical office
- 4.0 sone: typical television operating

For a fan which operates only occasionally (like a bath fan), a maximum sone level of 3.0 is considered acceptable. For a fan which is designed to operate continuously (e.g., a WHMV fan), a maximum sone level of 1.0 is necessary to avoid occupants turning off the fan from noise irritation.

The overwhelming majority of intermittent exhaust fans listed in the HVI products directory achieve a sone rating of 3 or less, so this requirement weeds out only the worst performers and therefore should have little to no impact to builders when specifying HVI certified products. The 1.0 sone requirement for WHMV fans has been achieved by over 500 fans listed in the Home Ventilating Institute's certified product directory (www.hvi.org). Further, the 1.0 sone requirement for WHMV fans can be viewed as a cost-saving measure. To find out why, see the cost impact section below.

References:

1. Nagda, N. L., M. D. Koontz, R. C. Fortmann, and I. H. Billick (1989) "Prevalence, Use, and Effectiveness of Range-Exhaust Fans." *Environment International* 15(1-6): 615–620.
2. Parrott, K., J. Emmel, and J. Beamish (2003) "Use of Kitchen Ventilation: Impact on Indoor Air Quality." In *The Forum for Family and Consumer Issues*, edited, North Carolina State University, Raleigh North Carolina.
3. Singer, B.C., W. W. Delp, and M. G. Apte (2011) *Experimental Evaluation of Installed Cooking Exhaust Fan Performance*. LBNL-4183E. Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.
4. Email communication with Don Stevens, Panasonic, dated 11/29/2012.

Cost Impact: Whole house mechanical ventilation (WHMV) fans are required by IRC N1103.5.1 to have a minimum fan efficacy greater than or equal to minimum required for Energy Star fans, meaning that whole-house mechanical ventilation fans are likely to also be Energy Star rated. To achieve the Energy Star rating, a fan must have a noise rating less than or equal to 1.0 sone. So, a WHMV fan which meets the energy efficacy requirements of the IRC is also likely to have a sone rating of 1.0 or less; therefore, no additional costs are expected from this change. Supposing a jurisdiction does not adopt Chapter 11 of the IRC, a builder could theoretically install a WHMV fan that has a sone rating of 3 or higher. If he does, the homeowners are not likely to operate the fan due to unacceptable noise levels, and when they experience poor indoor air quality as a result, a call-back is the next step. The cost of a call-back far outweighs the incremental cost of a 1.0 sone WHMV fan, making the 1.0 sone WHMV fan a cost-savings measure for those builders who are not currently specifying them.

M1507.3 (NEW)-RM-MOORE.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The code official cannot easily identify the sone ratings of fans from the HVI directory. The proposal could require more costly fans and this is not appropriate for a minimum code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan-NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1507.3 Sound Ratings. Ventilation fans <u>intended to operate continuously or as a component of a whole-house mechanical ventilation system</u> shall have a <u>maximum</u> sound performance <u>of 1.0 sone.</u>~~in accordance with the following:~~

~~1. For whole-house or continuous ventilation fans: maximum of 1.0 sone.~~
~~2. For intermittent local exhaust fans: maximum of 3.0 sone.~~

Exceptions:

1. Fans having a maximum rated airflow exceeding 400 cfm.
2. ~~HVAC air handlers and~~ Fans mounted with not less than 4 ft (1 m) of ductwork between the fan and the intake grille.
3. <u>Heating and cooling equipment air handlers.</u>

Commenter's Reason: Based on the committee's resistance to a maximum sound requirement for intermittently operating fans, this proposal has been modified to only address sound requirements for whole-house mechanical ventilation fans and fans that are intended to be operated continuously (e.g., a bath fan at 20 cfm per section M1507.4). This change is proposed to ensure that the fans which are critical to maintaining indoor air quality meet minimum requirements for acceptable levels of noise.

Ventilation fans only work when they're turned on, and the number one reason typically given by home owners for not turning on a ventilation fan is, "it's too noisy".[1,2,3] As homes have become tighter, the use of whole house mechanical ventilation (WHMV) for maintaining acceptable indoor air quality has become necessary. Installing a fan that will not be operated due to noise is a disservice to the homeowner, a liability to their health, and a risk to the home's durability (can lead to excess condensation on windows, increased potential for mold and rot, etc.).

This proposed requirement mirrors that adopted by the state of California and ASHRAE 62.2. Maximum sone levels for WHMV fans have been enforced by Washington State's code since the late 1980s. The sone values proposed above have been widely accepted by the industry. A sone is linear measure of loudness, meaning that a 1.0 sone fan is over three times as loud as the best rated fans in the HVI directory (i.e., 0.3 sones). The Home Ventilating Institute describes the sone scale as follows:

- 0.5 sone: rustling leaves
- 1.0 sone: refrigerator
- 3.0 sone: typical office
- 4.0 sone: typical television operating

For a fan which is designed to operate continuously (e.g., a WHMV fan), a maximum sone level of 1.0 is necessary to reduce the number of occupants that would turn off the fan due to noise irritation.

The 1.0 sone requirement for WHMV fans has been achieved by over 500 fans listed in the Home Ventilating Institute's certified product directory (www.hvi.org), with many fans operating at less than 0.3 sones.

References:

1. Nagda, N. L., M. D. Koontz, R. C. Fortmann, and I. H. Billick (1989) "Prevalence, Use, and Effectiveness of Range-Exhaust Fans." *Environment International* 15(1-6): 615–620.
2. Parrott, K., J. Emmel, and J. Beamish (2003) "Use of Kitchen Ventilation: Impact on Indoor Air Quality." In *The Forum for Family and Consumer Issues*, edited, North Carolina State University, Raleigh North Carolina.
3. Singer, B.C., W. W. Delp, and M. G. Apte (2011) *Experimental Evaluation of Installed Cooking Exhaust Fan Performance*. LBNL-4183E. Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.

RM40-13

Final Action: AS AM AMPC____ D

RM41-13
M1507.3.1

Proposed Change as Submitted

Proponent: Jerry Anderson, City of Overland Park, KS, representing self (jerry.anderson@opkansas.org)

Revise as follows:

M1507.3.1 System design. The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. <u>Systems designed to supply air shall supply outdoor air.</u> ~~Outdoor air ducts connected to the return side of an air handler shall be considered to provide supply ventilation.~~

Reason: The purpose of this code change is to make it clear that the airflow for mechanical ventilation systems designed to supply air shall take that air from the outdoors. The sentence being deleted is no longer necessary. It doesn't matter how the outdoor air is distributed. What matters in this code section is that supply air comes from the outdoors.

Cost Impact: No cost associated with this change.

M1507.3.1-RM-ANDERSON.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: This proposal completely changed the intent of this section. This language can now be interpreted as requiring 100% outdoor air to be delivered; no recirculation of indoor air is permitted with this language.

RM41-13
Final Action: AS AM AMPC____ D

RM42-13
M1507.3.2

Proposed Change as Submitted

Proponent: Jerry Anderson, representing the City of Overland Park, Kansas

Revise as follows:

M1507.3.2 System controls. ~~The~~ Whole-house mechanical ventilation systems designed for intermittent operation in accordance with Section M1507.3.3 shall utilize a 24 hour timer control capable of cycling the fan(s) on and off as needed. Whole-house mechanical ventilation systems shall be provided with controls that enable manual override.

Reason: The purpose of the code change is to require an automatic timer switch for those fans that are designed to be run intermittently. In the exception to Section M1507.3.3 the code allows for whole-house mechanical ventilation systems to be operated intermittently. The word "intermittently" can mean different things to different people. A local exhaust fan operated manually by a wall switch could easily be considered to be an intermittent fan system. I think that the code assumes that there will be some sort of automation built into intermittent systems. I don't think that the code intends the systems to be manually operated. Therefore, I have inserted language which makes it clear that a manual switch is not allowed.

Cost Impact: There would be a small cost associated with the timer switch, if they are not already being provide for.

M1507.3.2-RM-ANDERSON.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal will increase the cost of construction. Twenty-four hours is not the proper time interval.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Gerald Anderson, representing the City of Overland Park, Kansas, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1507.3.2 System controls. Whole-house mechanical ventilation systems designed for intermittent operation in accordance with Section M1507.3.3 shall utilize a ~~24 hour timer~~ control device capable of cycling the fan(s) on and off automatically as needed. Whole-house mechanical ventilation systems shall be provided with controls that enable manual override.

Commenter's Reason: The purpose of the code change is to require an automatic timer switch for those fans that are designed to be run intermittently. In the exception to Section M1507.3.3 the code allows for whole-house mechanical ventilation systems to be operated intermittently. The word "intermittently" can mean different things to different people. A local exhaust fan operated manually by a wall switch could easily be considered to be an intermittent fan system. I think that the code assumes that there will be some sort of automation built into intermittent systems. I don't think that the code intends the systems to be manually operated. Therefore, I have inserted language which makes it clear that a manual switch is not allowed.

RM42-13
Final Action: AS AM AMPC____ D

RM44-13
M1508.1 (New)

Proposed Change as Submitted

Proponent: Craig Conner, representing self

Add text as follows:

M1508.1 Venting and Depressurization. Gas-and oil-fired space- heating and gas-and oil-fired water-heating combustion appliances in new dwelling units shall comply with at least one of the following:

1. Space- heating and water-heating combustion appliances located within a dwelling unit's air barrier shall be of the direct-vent type.
2. Space heating appliances and water heating appliances located within a dwelling unit's air barrier shall be of the direct- vent or mechanical draft type. Mechanical ventilation shall be provided in accordance with Section M1507. Makeup air shall be provided for each of the dwelling unit's three largest exhaust systems at a rate approximately equal to or greater than the design exhaust rate. Makeup air systems shall be equipped with not less than one gravity or motorized damper. Motorized dampers shall be automatically controlled to operate simultaneously with the exhaust systems.
3. Space-heating and water-heating combustion appliances shall not be located within a dwelling unit's air barrier. For purposes of this option, appliances located in a mechanical room separated from the conditioned space by an air barrier shall be considered to be outside of a dwelling unit's air barrier.

Exceptions: The section shall not apply to:

1. Dwelling units with a tested air tightness of greater than 3 ACH50
2. Dwelling units having a tested depressurization that is within the limits specified by an approved test.

Reason: Backdrafting combustion appliances can lead to serious health consequences. The IECC and common practices are increasing the potential for backdrafting in homes. The IECC requires a building envelope tested to be 3 ACH50 or less in the middle and northern climate zones. This change is designed to greatly reduce the likelihood of backdrafting in those tight homes.

Back drafting is most likely to occur if three things are true- construction is airtight, exhaust-only ventilation is used, and atmospherically vented (natural draft) combustion appliances are in conditioned spaces. The IECC has both testing and prescriptive measures to increase envelope tightness and should routinely produce airtight construction. Mechanical ventilation is required for residences, with the least expensive form of mechanical ventilation being the exhaust-only ventilation fans already in common use. The energy code no longer encourages more efficient condensing furnaces by recognizing their high energy efficiency; thereby, removing some of the motivation for condensing furnaces. The trend towards large exhaust fans, such as kitchen hoods, also contributes to the problem. This combination is a recipe for back drafting problems.

The proposed change gives several options. These options prevent back drafting by eliminating at least one of major contributor; eliminating the natural draft (atmospherically vented) combustion appliances, eliminating the large exhaust-only ventilation, or taking the combustion outside the air barrier. An exception adds a depressurization test option, which tests for excessive depressurization levels in dwelling units.

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

M1508 (NEW)-RM-CONNER.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Same reason as RM32-13.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self and Dan Buuck, CBO, representing National Association of Home Builders (NAHB), request Approval as Modified by this Public Comment.

Modify the proposal as follows:

M1508.1 Venting and Depressurization. Gas-and oil-fired space- heating and gas-and oil-fired water-heating combustion appliances in new dwelling units shall comply with one or more of the following:

1. Space- heating and water-heating combustion appliances located within a dwelling unit's air barrier shall be of the direct-vent type.
2. Space heating ~~appliances~~ and water heating combustion appliances located within a dwelling unit's air barrier shall be of the ~~direct-vent or~~ *mechanical draft* type or a combination of mechanical draft and direct-vent types. Mechanical ventilation shall be provided in accordance with Section M1507. Makeup air shall be provided for each of the dwelling unit's ~~three~~ two largest exhaust systems, other than the kitchen exhaust system, at a rate approximately equal to or greater than the design exhaust rate. Makeup air systems shall be equipped with not less than one gravity or motorized damper. Motorized dampers shall be automatically controlled to operate simultaneously with the exhaust systems. Kitchen exhaust systems shall be provided makeup air in accordance with Section M1503.4.
3. Space-heating and water-heating combustion appliances shall not be located within a dwelling unit's air barrier~~. For purposes of this option, appliances located in a mechanical room separated from the conditioned space by an air barrier shall be considered to be outside of a dwelling unit's air barrier~~.

   Exceptions: The section shall not apply to:

   1. Dwelling units with a tested air tightness of greater than 3 ACH50.
   2. Dwelling units having a tested depressurization that is within the limits specified by an approved test.
   3. Dwelling units that do not have an exhaust-only whole-house mechanical ventilation system.
   4. Space-heating and water-heating combustion appliances that are located in a mechanical room and provided with combustion air supplied entirely from ducts to the outdoors or direct openings to the outdoors.

Commenter's Reason:
Conner: This modification:

--lets the existing kitchen exhaust section in the IRC continue to handle kitchen exhaust
--clarifies the language on the option for equipment in mechanical rooms
--makes it clear that eliminating exhaust-only ventilation is one option, but not a requirement

Buuck: Builders are concerned that more stringent energy codes have made previously acceptable building practices unsafe due to tighter building envelope requirements. This code change would create a new section to address depressurization concerns for the house as a system.

This public comment fixes a conflict in Item 2 with Section M1503.4 which addresses makeup air for kitchen exhaust systems. The originally proposed language requires makeup air to be "provided for each of the dwelling unit's three largest exhaust systems at a rate approximately equal to or greater than the design exhaust rate." This would apply to kitchen exhaust systems as well, and they are already covered in their own section.

The original proposal does not differentiate between appliances which draw their combustion air entirely from indoors and those that are supplied with outdoor combustion air only (either the one or two permanent opening method). Appliances that are supplied with air from permanent openings to the outside and located in a separate room will be "invisible" to depressurization elsewhere in the dwelling. (G2407.6).

Although creating a mechanical room that is separated from the conditioned space by an air barrier (see Item 3) may seem reasonable at first, this would be extremely difficult in those regions of the country where the furnace is in the same space as the water heater. It would be very difficult to create an air barrier around all the ductwork penetrating the mechanical room enclosure. In the residences where this option works, locating the appliances in a mechanical room closed off from the rest of the dwelling and supplying that room with combustion air directly from the outdoors protects the appliances from the effects of exhaust systems elsewhere in the dwelling.

The word "combustion" was added to Item 2 to correlate it with the language used in Items 1 and 3.

RM44-13
Final Action: AS AM AMPC____ D

RM45-13
M1601.1.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250ºF (121ºC).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).
3. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.

~~6. *Duct systems* shall be constructed of materials having a flame spread index not greater than 200.~~

~~7.~~ 6. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:

~~7.1~~ 6.1. These cavities or spaces shall not be used as a plenum for supply air.
~~7.2~~ 6.2. These cavities or spaces shall not be part of required fire-resistance-rated assembly.
~~7.3~~ 6.3. Stud wall cavities shall not convey air from more than one floor level.
~~7.4~~ 6.4 Stud wall cavities and joist-space plenum shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.
~~7.5~~ 6.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

Reason: Considering the subject of items #2 and #3, it is not apparent what item #6 is intended to address. Item #2 requires factory-made ducts to have a maximum flame spread index of 50, so why does item #6 state an index of 200 maximum?? Current section M1601.2 requires factory-made ducts to comply with UL 181, and UL 181 requires all ducts to have a maximum flame spread index of 50. If item #6 addresses factory-made ducts, then it conflicts with Item #2 and Section M1601.2.
If item #6 was intended to address plastic ducts, it then begs the question as whether plastic ducts are allowed above ground in dwellings. An ICC formal interpretation on this exact question was issued and it states that plastic ducts are allowed above ground if they can meet class 0 or class 1, meaning that the maximum flame spread index could not exceed 50. With the broad definition of "*duct systems*" in the IRC, the purpose of item #6 is even more unclear. Item #6 is confusing and appears to be unnecessary because the code already addresses the various duct materials in other text.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M1601.1.1 #1-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal eliminates the use of plastic ducts, registers and grills.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: Reason: Section 603.8.3 of the IMC specifically prohibits the use of plastic ducts and fittings in above-ground applications. Plastic ducts and fittings are not allowed in the IMC because they have not demonstrated equivalency with established performance, flame spread and smoke generation requirements for above ground ducts and fittings. As currently worded, Section 1601.1.1 item 6 can be interpreted to allow plastic ducts and fittings in above-ground applications.

Current requirements for aboveground ducts (SMACNA, NAIMA and UL) include performance requirements such as corrosion resistance, mold growth resistance, puncture, static load, impact, leakage, erosion, and other requirements as specified in the appropriate document. All of these ducts are required to meet a smoke generation index of 50 or less in addition to the flame spread index of 25 or less. All ducts should be required to meet the established performance, flame and smoke generation requirements which are vital to these systems.

Public Comment 2:

Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C., representing General Plastics, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250ºF (121ºC).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).
3. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. <u>Plastic</u> duct systems shall be constructed of materials having a flame spread index not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
   7.1 These cavities or spaces shall not be used as a plenum for supply air.
   7.2 These cavities or spaces shall not be part of a required fire-resistance-rated assembly.
   7.3 Stud wall cavities shall not convey air from more than one floor level.
   7.4 Stud wall cavities and joist-space plenum shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.
   7.5 Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

Commenter's Reason: While the PMG CAC indicated that they did not know the origin of this requirement, it was pointed out at the Dallas hearing that the requirement was based on the allowance of plastic duct systems above ground. Since this is the purpose of this section, rather than deleting the requirement, I have added clarity so that it would be understood what is permitted.
This code requirement can be traced back to a change that I proposed to allow plastic ducts above ground. The Committee chose to add an Item 6 rather than accept my more extensive change on plastic ducts. The Committee recognized that by inserting Item 6 my

change to allow plastic ducts was also accomplished.

It is unfortunate that this requirement has been misinterpreted. Adding the word “plastic” may eliminate all the misinterpretations.

RM45-13

Final Action: AS AM AMPC____ D

RM53-13
M1601.4.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Vickie Lovell, InterCode Inc., representing DuctMate Industries (Vickie@intercodeinc.com)

Revise as follows:

M1601.4.1 Joints, seams and connections. All longitudal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181 B-FX" for pressure sensitive tape or "181 BM" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked 181B-C. Crimp joints for round metallic ducts shall have a contact lap of not less than 1 inch (25.4 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws or rivets equally spaced around the joint. Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturers' instructions. Round metallic ducts shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint. Unlisted duct tape shall not be permitted as a sealant on any duct.

Exceptions:

1. Spray polyurethane foam shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. ~~Continuously welded and locking type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~ <u>For ducts having a static pressure classification of less than 2 inches of water column (500Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.</u>

Reason:
(Hall-PMGCAC): Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints. This text was approved for the 2015 IMC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Lovell): This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC. That reason statement is supplied below:

Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints.

The identical proposal that was approved As Submitted in the Mechanical Code hearings in Portland is being submitted to the 2015 IECC residential requirements for consistency.

Cost Impact:
(Hall-PMGCAC): The code change proposal will not increase the cost of construction.

(Lovell): This proposal reduces the cost of installation.

M1601.4.1 #2-RM-HALL-LOVELL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal increases the cost of construction and provides insufficient benefit for the added cost. Duct leakage within the thermal envelope is not a problem.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Vickie Lovell, INTERCODE, INC., representing Rectorseal, requests Approval as Submitted.

Commenter's Reason: We respectfully disagree with the committee's reason for disapproval. Leakage in ducts with snap-lock and button type seam IS a problem unless a sealant or gasket is used. The small increase in cost provides a realized cost-benefit from the optimum performance of the HVAC system to cool and heat the house.

The IMC code development committee and the voting audience agreed and voted for approval of this code change proposal for the 2015 IMC. The ICC PMG Code Action Committee and the IECC Code Development Committee also recommended approval of this proposal**.**

Public Comment 2:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The committee believed that ducts should be able to leak into the conditioned spaces, however, this section addresses ducts in all locations including those outside of the conditioned space. Duct leakage is detrimental even within the conditioned space because the system will not deliver air to the intended spaces if the ducts leak air into unintended locations. The system will result in overheated or over cooled spaces and under heated or under cooled spaces which causes thermostat adjustments to overcome the thermal discomfort of the occupants. This results in poor energy performance.

RM53-13
Final Action: AS AM AMPC____ D

RM54-13
M1601.4.10 (New)

<u>Proposed Change as Submitted</u>

Proponent: Josh O'Connor, representing self

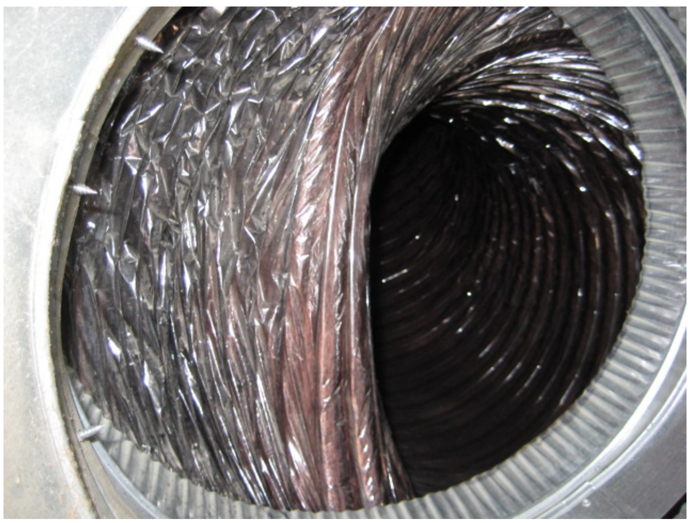
Add new text as follows:

<u>**M1601.4.10 Wall Pass-Through.** The opening in a concrete or masonry foundation wall through which supply and return air ducts from an HVAC unit are intended to pass shall have a width of not less than 42 inches.</u>

Reason: National homebuilders are making this opening only 32 inches wide. This is not wide enough for the supply and return air ducts to have a straight run through the wall from the supply and return ports on the HVAC unit.

When the air ducts have to veer sharply in one direction after they come off of the port in order to get to the opening in the wall, airflow is restricted inside the duct. NOTE: the ports open straight forward, facing the wall of the house. When the duct veers, it blocks the opening of the port. The ducts need a straight run.

Three (3) photos are attached to this proposal form. (photos were taken at my residence, after rain hood was removed from the HVAC unit)



Cost Impact: NONE

M1601.4.10-RM-O'CONNOR.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The opening size depends on the size of the ducts, not some arbitrary dimension such as 42 inches. Proper fittings should be used.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Josh O'Connor, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~M1604.4.10~~ R404.6 Wall Pass-Through. The opening in a concrete or masonry foundation wall through which supply and return air ducts from an HVAC unit are intended to pass shall have a width of not less than 42 inches.

Commenter's Reason: This proposal should never have been placed in Mechanical because this proposal addresses the building of the foundation wall, not the installation of mechanical. This proposal was disapproved in Committee Action Hearings in Mechanical.

RM54-13

Final Action: AS AM AMPC____ D

RM56-13
M1601.4.3

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1601.4.3 Support. ~~Metal ducts shall be supported by 1/2-inch (13 mm) wide 18-gage metal straps or 12-gage galvanized wire at intervals not exceeding 10 feet (3048 mm) or other *approved* means. Nonmetallic ducts shall be supported in accordance with the manufacturer's installation instructions.~~ Ducts shall be supported in accordance with SMACNA *HVAC Duct Construction Standards—Metal and Flexible*.

Reason: This section should just reference the SMACNA standards as opposed to specifying a support interval. The 10 foot interval requirement is too broad and is inappropriate for many sizes and types of ducts . Many ducts require closer supports. This text could be easily interpreted as allowing 10 feet maximum support intervals for all ducts. This section is not being enforced since nobody installs 18 gage metal straps to support residential ducts.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

. **M1601.4.3-RM-HALL-PMGCAC**

Committee Action Hearing Results

Committee Action: **Disapproval**

Committee Reason: Multiple attempts to modify the proposal indicate that it needs to be reworked in a public comment.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

M1601.4.3 Support. ~~Metal ducts shall be supported by 1/2-inch (13 mm) wide 18-gage metal straps or 12-gage galvanized wire at intervals not exceeding 10 feet (3048 mm) or other *approved* means. Nonmetallic ducts shall be supported in accordance with the manufacturer's installation instructions.~~ Factory made ducts listed in accordance with UL181 shall be supported in accordance with the manufacturer's installation instructions. Field- and shop-fabricated fibrous glass ducts shall be supported in accordance the SMACNA *Fibrous Glass Duct Construction Standards* or the NAIMA *Fibrous Glass Duct Construction Standards*. Field- and shop-fabricated metal and flexible ducts shall be supported in accordance with the SMACNA *HVAC Duct Construction Standards—Metal and Flexible*.

Reason: The 10 foot interval requirement is too broad and is inappropriate for many sizes and types of ducts . Many ducts require closer supports. This text could be easily interpreted as allowing 10 feet maximum support intervals for all ducts. This section should just reference the appropriate support requirements as specified in the applicable manual or listing. Definitions are added to clarify intent of terminology for the different type of ducts

RM56-13

Final Action: AS AM AMPC____ D

RM58-13
M1602.4 (New), M1602.4.1 (New)

Proposed Change as Submitted

Proponent: Jeff Sonne, Florida Solar Energy Center, representing the Florida Solar Energy Center, (jeff@fsec.ucf.edu)

Add new text as follows:

M1602.4 Balanced return air. Provisions shall be made to prevent unbalanced air flows and pressure differentials caused by restricted return air flow. Pressure differentials caused by air distribution systems across individually closed interior doors, where return air intakes are centrally located, shall be limited to 0.01 inch WC (2.5 pascals). Pressure differentials across fire walls and other partitions within ceiling space plenums shall be limited to 0.01 inch WC (2.5 pascals) by providing air duct pathways or air transfer pathways from the high pressure zone to the low pressure zone.

M1602.4.1 Prescriptive alternatives. The following are alternatives to the requirements of Section M1602.4 and apply only to habitable rooms.

1. Transfer ducts or other transfer pathways shall be provided and shall have an area that is not less than 1½ times the cross sectional area of the supply duct or supply ducts serving the room or space. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.
2. Transfer grilles shall be provided and shall have an area of not less than 0.50 square inches for each 1 cfm of supply air. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.

Reason: Restricted return air affects building pressures and increases air infiltration which in turn increases energy use and can cause comfort, building durability, and health and safety issues. A similar balanced return air requirement is already in the Florida Building Code for these reasons.

Supporting publication: Cummings, J., C. Withers, "Balanced Return Air, Duct Airtightness, and Combustion/Dilution Air Code Compliance in 40 Central Florida Homes" Florida Solar Energy Center, FSEC-CR-1789-06, Nov. 29, 2006. (http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1789-06.pdf)

Cost Impact: The code change proposal will increase the cost of construction. A Florida HVAC contractor indicates the extra material cost for a three bedroom home is $60 and 1.5 hours of labor. In his opinion, a very small price for the extra comfort and avoidance of problems.

M1602.4 (NEW)-RM-SONNE.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed text:

1. Increases the cost of construction.
2. Is too confusing.
3. Is above minimum code.
4. Is Florida specific.
5. Will be difficult to inspect.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeff Sonne representing Florida Solar Energy Center, requests Approval as Submitted.

Committee Reason: The proposed text:

1. Increases the cost of construction.
   a. Comment: while installing return air pathways adds to first cost, it reduces energy waste that results from increased air infiltration and yields a reduced life-cycle cost. Monitored energy savings finds payback of 3 years.
2. Is too confusing.
   a. Comment: this has been successfully implemented in Florida with little difficulty. Comparison of homes built prior to the code change to those after the code change showed a 74% reduction in pressure differentials across closed interior doors, from an average of 9.1 pascals to 2.4 pascals.
3. Is above minimum code.
   a. Comment: Providing return air pathways should be minimum code requirements and has been accepted as good practice for decades.
4. Is Florida specific.
   a. Comment: While much of the research has been done in Florida, the problem exists across the United States, wherever unequal return and supply air flows occur within an enclosed space.
      i. In hot and humid climates, the unbalanced return air causes significant increase in air flow across the building envelope, adding to space conditioning loads and increasing latent loads and indoor relative humidity.
      ii. In cold climates, unbalanced return air also causes significant increase in air flow across the building envelope, which increases space conditioning loads, may push indoor relative humidity to unacceptably low levels, and may lead to freezing of pipes.
5. Will be difficult to inspect.
   a. Comment: The prescriptive alternatives are widely used in Florida, and there have been few problems in verifying compliance in Florida code jurisdictions. Inspection of these alternatives is straightforward.
   b. Contractors readily learn what steps are required to achieve the 2.5 pascal target.

RM58-13

Final Action: AS AM AMPC____ D

RM59-13
M1804.4 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Add new text as follows:

M1804.4 Door swing. Appliance and equipment vent terminals shall be located such that doors cannot swing within 12 inches (305 mm) horizontally of the vent terminals. Door stops or closures shall not be installed to obtain this clearance.

Reason: This new language was approved for the 2015 IMC. Any appliance vent can be subject to damage as a result of a door swing even when the vent has been installed in accordance with the manufacturer's instructions. Most manufacturers do not address proximity to doors on a different plane. Even if the door doesn't come in contact with the vent terminal, the door could be left too close to the vent when the appliance is operating and possibly overheating the door and/or interfering with the operation of the vent terminal.

Cost Impact: None

M1804.4 (NEW)-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This text is not needed because it is covered in section G2427.6.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Approval as Submitted.

Commenter's Reason: This was approved by the Mechanical and Fuel Gas committees and is applicable in this Section. The Committee concern was that this will already be covered in Chapter 24. Chapter 24 will have this exact same text because it was approved in the IFGC. Chapter 24 extracts the IFGC text. Putting this text in Chapter 18 will cover vent terminals from oil and biomass-fired appliances.

Public Comment 2:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The committee stated that this proposed text is already provided in Section G2427.6 of the IRC. The venting provisions related to doors and windows found in Chapter 24 have nothing to do with the door swing issue addressed by the proposed new text. Chapter 24 deals with the concern for vent gasses entering the building, not the concern for the door impacting the vent terminal. Neither the codes nor the manufacturer's instructions cover the issue of doors swinging into vent terminals.

Chapter 18 covers other than gas-fired appliance vent terminals. The new text in this proposal will automatically be added to Chapter 24 as it is taken from the IFGC.

RM59-13
Final Action: AS AM AMPC____ D

RM62-13
M2001.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M2001.1 Standards. Packaged oil-fired boilers ~~and their control systems shall~~ be listed and labeled in accordance with UL 726. Packaged electric boilers ~~and their control systems~~ shall be listed and labeled in accordance with UL 834. Solid-fuel-fired boilers shall be listed and labeled in accordance with UL 2523. Boilers shall be designed, ~~and~~ constructed and certified in accordance with the requirements of ASME CSD-1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Section I or IV. Controls and safety devices for boilers with fuel input ratings of 12,500,000 Btu/hr (3 663 388 watts) or less shall meet the requirements of ASME CSD-1. Gas fired boilers shall conform to the requirements listed in Chapter 24.

Reason: This revised language was approved for the 2015 IMC. Current wording is not correct since ASME CSD-1 is not a construction standard. The proposed wording starts with the vessel construction requirements and continues with the acceptable standards for complete appliances. The proposed wording is no change from the intent of the previous wording.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

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

M2001.1-RM-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M2001.1 Standards. Packaged oil-fired boilers be listed and labeled in accordance with UL 726. Packaged electric boilers shall be listed and labeled in accordance with UL 834. Solid-fuel-fired boilers shall be listed and labeled in accordance with UL 2523. Boilers shall be designed, constructed and certified in accordance with the ~~requirements of ASME CSD-1 and as applicable, the~~ ASME *Boiler and Pressure Vessel Code*, Section I or IV. Controls and safety devices for boilers with fuel input ratings of 12,500,000 Btu/hr (3 663 388 watts) or less shall meet the requirements of ASME CSD-1. Gas fired boilers shall conform to the requirements listed in Chapter 24.

Commenter's Reason: The proposed wording was recommended for approval by the committee but the text does not match the parallel section in the IMC. Boilers are not constructed in accordance with ASME CSD-1. The intent of this proposal was to match the IMC, therefore a slight modification is needed to accomplish this.

RM62-13

Final Action: AS AM AMPC____ D

RM72-13
M2103.3, Chapter 44

Proposed Change as Submitted

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting, representing Copper Development Association (penniefeehan@me.com)

Revise as follows:

M2103.3 Piping joints. <u>Copper and copper alloys systems shall be soldered in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813 and shall become noncorrosive and non-toxic after soldering. Brazing fluxes shall be in accordance with AWS A5.31.</u> Piping joints that are embedded shall be installed in accordance with the following requirements:

Add new standard to Chapter 44 as follows:

<u>ANSI/AWS A5.31M/A5.31:2012 Specification for Fluxes for Brazing and Braze Welding Edition: 2nd</u>

Reason: Because hydronic systems are not potable system, inspectors and installers are not following the proper methods of installing copper pipe and tubing. Fluxes used for soldering copper tube and fittings must meet the requirements of ASTM B813.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [ANSI/AWS A5.31M/A5.31-2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

M2103.3-RM-FEEHAN.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal will improve joint quality.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M2103.3 Piping joints. Copper and copper alloys systems shall be soldered in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813 ~~and shall become noncorrosive and non-toxic after soldering~~. Brazing fluxes shall be in accordance with AWS A5.31. Piping joints that are embedded shall be installed in accordance with the following requirements:

Items 1 through 6 *(no change to current text)*

Commenter's Reason: The additional language shown struck out is not needed in the code text as fluxes are required to be non corrosive and non toxic per ASTMB813. The field inspector must rely on the standard to specify this and will not be able to test for the non corrosiveness or toxicity in the field.

RM72-13

Final Action: AS AM AMPC____ D

RM77-13

M2301.2.2 (New), M2301.2.2, M2301.2.2.2 (New), Chapter 44

Proposed Change as Submitted

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.2.2 Collectors and panels. Solar collectors and panels shall comply with Sections M2301.2.2.1 and M2301.2.2.2.

M2301.2.2.1 ~~**M2301.2.2**~~ **Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.

M2301.2.2.2 Collector sensors. Collector sensor installation, sensor location and the protection of exposed sensor wires from ultraviolet light shall be in accordance with SRCC 300.

Add new standard to Chapter 44 as follows:

SRCC
Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.2.2 into a parent section and two subsections. This was done in order to reference requirements related to collector sensors that are contained in SRCC 300. These collector sensor requirements are based on the manner in which the New York State Field Inspection Guidelines for Solar Heating Systems reference the SRCC standards.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

M2301.2.2 (NEW)-RM-HALL-THOMPSON-SEHPCAC.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed text is in the wrong location in the code. SRCC 300 is not appropriate for Solar voltaic systems.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Submitted.

Commenter's Reason: The IRC Committee's reason for disapproval of RM77 was that "The proposed text is in the wrong location in the code" and that "SRCC 300 is not appropriate for "solar voltaic systems." However, the proposal was not to portions of the code that addressed "solar voltaic systems." It was to portions of Section M2301 which, in the 2012 IRC, addresses solar thermal systems. It is Section M2302 of the 2012 IRC that addresses "solar voltaic systems." SRCC 300 is a standard that is related to solar thermal systems. Thus the proposal appears to be appropriate as properly evaluated by the committee's evaluation criteria.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RM77-13

Final Action: AS AM AMPC____ D

RM78-13
R202, M2301.2.2, M2301.2.7, M2302.2.1, M2302.2.2, M2301 (New)

Proposed Change as Submitted

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Delete as follows:

~~**M2301.2.2 Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

~~**M2301.2.7 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 of this code to prevent entry of water, rodents and insects.~~

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire retardant treated wood equivalent to that required for the roof construction.~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.~~

Add new definitions as follows:

SECTION R202
DEFINITIONS

BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

PHOTOVOLTAIC SHINGLES. A roof covering resembling shingles that incorporates photovoltaic modules.

SOLAR THERMAL COLLECTOR. A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.

SOLAR THERMAL LOOP. The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

SOLAR THERMAL ABSORBER. A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

SOLAR THERMAL PANEL. A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

SOLAR THERMAL PANEL SYSTEM. A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

SOLAR THERMAL SYSTEM. An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.

Add new text as follows:

SECTION M2301
GENERAL

M2301.1 General. This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.

M2301.2 Solar energy equipment and appliances. Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

M2301.3 Solar energy system structural requirements. Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.

M2301.3.1 Systems mounted directly to or above the roof covering. Rooftop solar thermal systems, solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

M2301.3.2 Systems that serve as roof coverings. Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including, photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

M2301.3.3 Ground mounted systems. Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.

M2301.4 Corrosion prevention. Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

M2301.5 Interference. Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

M2301.6 Roof and wall penetrations. Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

M2301.7 Rooftop mounted system fire classification. Rooftop mounted solar systems shall comply with Section 902.1.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

a. Proposed new Section M2301 creates general provisions which are applicable to both solar thermal and solar photovoltaic systems. Solar system designers and installers, as well as code enforcement officials, are often confused as to what is applicable to solar systems.
b. Although it may appear at first glance that existing Sections M2301.2.2 and M2302.2.1 of the 2012 IRC, which address roof-mounted collectors, panels and modules, are being deleted, this proposal moves and clarifies those requirements in proposed new Sections M2301.3 through M2301.3.3.
c. Although it may appear at first glance that existing Sections M2302.2.2 and M2301.2.7 of the 2012 IRC, which address roof and wall penetrations, are being deleted, this proposal moves and clarifies those requirements in proposed new Section M2301.6. New Section M2301.6 also clarifies where the flashing as sealing requirements are located in the code.
d. The definitions for the following are based on definitions as they will appear in the 2015 IBC: photovoltaic panel, photovoltaic module, photovoltaic shingle, building integrated photovoltaic product and photovoltaic panel system.
e. Proposed Section M2301.2 is a modification of Section 1401.4 of the 2012 International Mechanical Code.
f. Proposed Sections M2301.3 through M2301.3.3 provide requirements related to the structural implications of various types of solar systems as related to the way in which they are mounted, supported and located. ICC ES AC428 and AC365 acceptance criteria may also be valuable in the approval of systems for compliance with this section, subject to the evaluation of the local building official.
g. Proposed Sections M2301.4, M2301.5 and M2301.6 are derived from the California Solar Permitting Guidebook.
h. Existing Section M2302.2.2 is revised and renumbered/relocated to proposed Section M2301.6.
i. Proposed Section M2301.7 is essentially a pointer that alerts manufacturers, designers and contractors to the fact that Section 902.1 may have significant implications on solar systems. In cases where the building is located within 3 feet of lot lines, testing for fire classification is required for rooftop systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

M2301.2.2-RM-HALL-THOMPSON-SEHPCAC.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed text is in the wrong location in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

SECTION R324
SOLAR ENERGY SYSTEMS

R324.1 General. Solar energy systems shall comply with the provisions of Section R324.

R324.1.1 Ground mounted collectors, panels and modules. Ground mounted solar collectors, panels and modules shall be subject to the fire separation distance requirements of Section R302.1.

Commenter's Reason: The IRC Building Committee's reason for disapproval was that "The proposed text is in the wrong location in the code." The committee approved RM98 Part II, which created a new Section R324 for general solar provisions, references and revises Chapter 23 so that it only addresses solar thermal systems, and relocates the solar photovoltaic provisions to Section R324.4 and Chapter 9. This proposal recognizes these new solar scenarios and revises RM78 to add a subsection to the new "general" solar energy system provisions of Section R324.1, as proposed by RM98 Part II. This new subsection addresses fire separation distance requirements for both solar thermal and solar photovoltaic ground mounted solar systems. As proposed, this public comment will work whether or not RM78 is ultimately approved.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RM78-13
Final Action: AS AM AMPC____ D

RM80-13
R202, M2301.2.2, M2301.2.7, M2302.2.1, M2302.2.2, M2301 (New)

Proposed Change as Submitted

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Delete as follows:

~~**M2301.2.2 Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

~~**M2301.2.7 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 of this code to prevent entry of water, rodents and insects.~~

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire retardant treated wood equivalent to that required for the roof construction.~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.~~

Add new definitions as follows:

SECTION R202
DEFINITIONS

BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

PHOTOVOLTAIC SHINGLES. A roof covering resembling shingles that incorporates photovoltaic modules.

SOLAR THERMAL COLLECTOR. A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.

SOLAR THERMAL LOOP. The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

SOLAR THERMAL ABSORBER. A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

SOLAR THERMAL PANEL. A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

SOLAR THERMAL PANEL SYSTEM. A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

SOLAR THERMAL SYSTEM. An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.

Add new text as follows:

SECTION M2301
GENERAL

M2301.1 General. This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.

M2301.2 Solar energy equipment and appliances. Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

M2301.3 Solar energy system structural requirements. Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.

M2301.3.1 Systems mounted directly to or above the roof covering. Rooftop solar thermal systems, solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

M2301.3.2 Systems that serve as roof coverings. Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including, photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

M2301.3.3 Ground mounted systems. Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.

M2301.4 Corrosion prevention. Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

M2301.5 Interference. Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

M2301.6 Roof and wall penetrations. Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

M2301.7 Rooftop mounted system fire classification. Rooftop mounted solar systems shall comply with Section 902.1.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

a. Proposed new Section M2301 creates general provisions which are applicable to both solar thermal and solar photovoltaic systems. Solar system designers and installers, as well as code enforcement officials, are often confused as to what is applicable to solar systems.
b. Although it may appear at first glance that existing Sections M2301.2.2 and M2302.2.1 of the 2012 IRC, which address roof-mounted collectors, panels and modules, are being deleted, this proposal moves and clarifies those requirements in proposed new Sections M2301.3 through M2301.3.3.
c. Although it may appear at first glance that existing Sections M2302.2.2 and M2301.2.7 of the 2012 IRC, which address roof and wall penetrations, are being deleted, this proposal moves and clarifies those requirements in proposed new Section M2301.6. New Section M2301.6 also clarifies where the flashing as sealing requirements are located in the code.
d. The definitions for the following are based on definitions as they will appear in the 2015 IBC: photovoltaic panel, photovoltaic module, photovoltaic shingle, building integrated photovoltaic product and photovoltaic panel system.
e. Proposed Section M2301.2 is a modification of Section 1401.4 of the 2012 International Mechanical Code.
f. Proposed Sections M2301.3 through M2301.3.3 provide requirements related to the structural implications of various types of solar systems as related to the way in which they are mounted, supported and located. ICC ES AC428 and AC365 acceptance criteria may also be valuable in the approval of systems for compliance with this section, subject to the evaluation of the local building official.
g. Proposed Sections M2301.4, M2301.5 and M2301.6 are derived from the California Solar Permitting Guidebook.
h. Existing Section M2302.2.2 is revised and renumbered/relocated to proposed Section M2301.6.
i. Proposed Section M2301.7 is essentially a pointer that alerts manufacturers, designers and contractors to the fact that Section 902.1 may have significant implications on solar systems. In cases where the building is located within 3 feet of lot lines, testing for fire classification is required for rooftop systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

M2301.2.2-RM-HALL-THOMPSON-SEHPCAC.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposed text does not belong in the mechanical section of the code. Ground mounted systems should not be considered as structures. The wrong UL standard is referenced.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R202
DEFINITIONS

~~**BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.~~

~~**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.~~

~~**PHOTOVOLTAIC PANEL.** A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.~~

~~**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.~~

~~**PHOTOVOLTAIC SHINGLES.** A roof covering resembling shingles that incorporates photovoltaic modules.~~

SOLAR THERMAL COLLECTOR. A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.

SOLAR THERMAL LOOP. The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

SOLAR THERMAL ABSORBER. A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

SOLAR THERMAL PANEL. A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

SOLAR THERMAL PANEL SYSTEM. A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

SOLAR THERMAL SYSTEM. An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.

SECTION ~~M2301~~ <u>R324</u>
GENERAL

<u>R324.1</u> ~~M2301.1~~ General. <u>Solar energy systems shall comply with the provisions of Section R324.1.1 thru R324.2.5.</u> ~~This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.~~

<u>R324.1.1</u> ~~M2301.2~~ Solar energy equipment and appliances. Solar <u>thermal and solar photovoltaic</u> energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

<u>R324.1.2</u> ~~M2301.4~~ Corrosion prevention. Solar <u>thermal and solar photovoltaic</u> equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

<u>R324.1.3</u> ~~M2301.5~~ Interference. Solar <u>thermal and solar photovoltaic</u> collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

R324.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Chapter 23, Section R324.1 and Sections R324.2.1 through R324.2.5.

R324.2.1 ~~**M2301.3 Solar energy system**~~ **Structural requirements.** Structural requirements for solar thermal energy systems shall be based upon the type, location and configuration of the system.

R324.2.2 ~~**M2301.3.1**~~ **Systems mounted directly to or above the roof covering.** Rooftop solar thermal systems, and solar thermal panel systems~~, and photovoltaic panel systems~~ that are mounted above the roof covering shall be designed in accordance with ~~the International Building Code~~ Section R301 to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

R324.2.3 ~~**M2301.3.2**~~ **Systems that serve as roof coverings.** Where solar thermal systems, or solar thermal panel systems~~, and building integrated photovoltaic systems including, photovoltaic shingles,~~ serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

~~**M2301.3.3 Ground mounted systems.** Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.~~

R324.2.4 ~~**M2301.6**~~ **Roof and wall penetrations.** Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

R324.2.5 ~~**M2301.7**~~ **Rooftop mounted system fire classification.** Rooftop mounted solar thermal systems shall comply with Section 902.1.

Commenter's Reason: The committee's reasons for disapproval were that 1) "the proposed text does not belong in the mechanical section of the code 2) "ground mounted systems should not be considered as structures" and 3) "the wrong UL standard is referenced."

Response to Reason 1: This public comment moves the general solar provisions of the original proposal to a new Section R324.1, which aligns with the IRC Building Committee's recommendation to approve RM98, which created a new Section R324 titled "Solar energy."

Response to Reason 2: Ground mounted systems are indeed structures. Section R202 defines "structure" as "that which is built or constructed." This public comment, however, references Section 301 of the IRC instead of sending the user directly to the IBC.

Response to Reason 3: This proposal did not and does not reference any UL standards.

This proposal is coordinated with, does not conflict with, and is not dependent upon the final action on RM98. This public comment further revises the original proposal to fill in gaps related to solar thermal, and to delete requirements related to solar photovoltaic that may conflict or be redundant with RM98.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC as well as interested parties to discuss and debate proposed changes and public comments.

Public Comment 2:

Lorraine A Ross, Intech Consulting Inc, representing The Dow Chemical Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R202
DEFINITIONS

BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of ~~tracking hardware~~ a tracker, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

PHOTOVOLTAIC SHINGLES. A roof covering resembling shingles that incorporates photovoltaic modules.

SOLAR THERMAL COLLECTOR. ~~A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.~~ A device that absorbs incident solar radiation, converts it to thermal energy, and transfers thermal energy to a heat transfer medium.

SOLAR THERMAL LOOP. The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

SOLAR THERMAL ABSORBER. A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

SOLAR THERMAL PANEL. A solar thermal collector ~~individually mounted or~~ mounted ~~to or~~ within a frame, ~~fastened,~~ and designed to provide a field installable unit.

SOLAR THERMAL PANEL SYSTEM. A system that incorporates one or more ~~discrete~~ solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

SOLAR THERMAL SYSTEM. An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy that is transferred directly or indirectly ~~and transfer it~~ to a gas or liquid and ~~passing through the system. The heated gas or liquid~~ that is then stored or used to provide hot water, space heating, or cooling.

~~SECTION M2301~~
~~GENERAL~~

~~**M2301.1 General.** . This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.~~

~~**M2301.2 Solar energy equipment and appliances.** Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.~~

~~**M2301.3 Solar energy system Structural requirements.** Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.~~

~~**M2301.3.1 Systems mounted directly to or above the roof covering.** Rooftop solar thermal systems solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.~~

~~**M2301.3.2 Systems that serve as roof coverings.** Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including, photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.~~

~~**M2301.3.3 Ground mounted systems.** Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.~~

~~**M2301.4 Corrosion prevention.** Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.~~

~~**M2301.5 Interference.** Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.~~

~~**M2301.6 Roof and wall penetrations.** Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.~~

~~**M2301.7 Rooftop mounted system fire classification.** Rooftop mounted solar systems shall comply with Section 902.1.~~

Commenter's Reason: This public comment preserves the suggested definitions for the different types of solar energy systems. The definitions have been modified where necessary to conform with other IRC proposals that were approved. Similarly, the Committee Approval as Modified of RM98-13 established a new general section for Solar Energy Systems – R324. Therefore, Section M2301 as shown is deleted.

RM80-13

Final Action: AS AM AMPC____ D

RM87-13
M2301.2.6 (New), M2301.2.7 (New)

Proposed Change as Submitted

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.2.6 Mixing valves. Where heated water is discharged from a solar thermal system to a hot water distribution system, a thermostatic mixing valve complying with ASSE 1017 shall be installed to temper the water to a temperature of not greater than 140^{o}F. Solar thermal systems supplying hot water for both space heating and domestic uses shall comply with Section P2802.2. A temperature indicating device shall be installed to indicate the temperature of the water discharged from the outlet of the mixing valve. The thermostatic mixing valve required by this section shall not be a substitute for water temperature limiting devices required by Chapter 27 for specific fixtures.

M2301.2.7 Isolation valves. Isolation valves shall be provided on the cold water feed to the water heater. Isolation valves and associated piping shall be provided to bypass solar storage tanks where the system contains multiple storage tanks.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

These proposed new sections address mixing valves and isolation valves in solar thermal systems. They are based on Section P2803.3 of the 2012 IRC and criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

M2301.2.6 (NEW) #2-RM-HALL-THOMPSON-SEPHCAC.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed text belongs in the plumbing chapters. Related subject text should be pulled together and placed in the proper location.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

Add new text as follows:

SECTION P2802
SOLAR WATER HEATING SYSTEMS

P2802.1 Water temperature control. Where heated water is discharged from a solar thermal system to a hot water distribution system, a thermostatic mixing valve complying with ASSE 1017 shall be installed to temper the water to a temperature of not greater than 140^{o}F. Solar thermal systems supplying hot water for both space heating and domestic uses shall comply with Section P2802.2. A temperature indicating device shall be installed to indicate the temperature of the water discharged from the outlet of the mixing valve. The thermostatic mixing valve required by this section shall not be a substitute for water temperature limiting devices required by Chapter 27 for specific fixtures.

P2802.2 Isolation valves. Isolation valves in accordance with P2903.9.2 shall be provided on the cold water feed to the water heater. Isolation valves and associated piping shall be provided to bypass solar storage tanks where the system contains multiple storage tanks.

Commenter's Reason: The PMGCAC and SEHPCAC agree with the committee's recommendation to place the new information in the plumbing section of the code.

This public comment is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception, the PMGCAC and SEHPCAC have held numerous open meetings and workgroup calls which included members of the PMGCAC and SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RM87-13

Final Action: AS AM AMPC____ D

RM92-13
M2301.6 (New)

Proposed Change as Submitted

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.6 Filtering. Air provided to occupied spaces through rock or other dust-producing materials shall be filtered for particulates at the outlet of the heat storage system.

> **Exception:** Filters shall not be required where air movement is by means of natural convection.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows: This proposed new section is similar to Section 1402.7 of the 2012 International Mechanical Code. It requires filtering in order to remove dust and particulates from mechanically forced air that has passed through a thermal storage area containing materials such as, but not limited to, pebbles or rock. A filter is not required for passive systems because the air velocity is typically not sufficient to carry particulates. Furthermore, a filter in a passive system could greatly impede natural convective airflow.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where rock based or dust-producing heat storage systems are provided, this proposal may increase the cost of construction.

M2301.6 (NEW) #1-RM-HALL-THOMPSON-SEHPCAC.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The code should refer to the manufacturer's instructions for dust- producing materials. "Dust-producing" is not defined.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M2301.6 Filtering. Air provided to occupied spaces <u>that passes through thermal mass storage systems by mechanical means</u> ~~through rock or other dust-producing materials~~ shall be filtered for particulates at the outlet of the ~~heat~~ <u>thermal mass</u> storage system.

~~**Exception:** Filters shall not be required where air movement is by means of natural convection.~~

Commenter's Reason: The committee's reason for disapproval was that "dust-producing materials" was not defined. This public comment revises the proposal to remove that term from the proposal.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

RM92-13

Final Action: AS AM AMPC____ D

RM93-13

M2301.6 (New), M2301.6.1 (New), M2301.6.2 (New), P2902.5.5

Proposed Change as Submitted

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.6 Solar systems for heating potable water. Where a solar energy system heats potable water to supply a potable hot water distribution system, the solar energy system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

M2301.6.1 Indirect systems. Heat exchangers that are components of indirect heating systems shall comply with Section P2902.5.2.

M2301.6.2 Direct systems. Where potable water is directly heated, the pipe, fittings and valves between the solar collectors and the hot water storage tanks shall comply with NSF 61.

Revise as follows:

P2902.5.5 Solar systems. ~~The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer.~~ Where a potable water supply is connected to the solar collector circulation loop piping of an indirect solar water heating system and chemicals are not used in the circulation loop piping, a backflow preventer in accordance with ASSE 1012 shall be installed between the potable water system and the circulation loop piping. Where chemicals are used in the solar collector circulation loop piping, such backflow preventer shall be in accordance with ASSE 1013.

> ~~**Exception:** Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.~~

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

Chapter 23 should include Sections M2301.6, M2301.6.1 and M2301.6.2 in order to address specific requirements for solar energy systems where they are used to heat potable water for supply to a potable hot water distribution system. Section M2301.6.1 is a pointer to a section that covers heat exchangers in the plumbing code section of the IRC:

> **P2902.5.2 Heat exchangers.** Heat exchangers using an essentially toxic transfer fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. Heat exchangers utilizing an essentially nontoxic transfer fluid shall be permitted to be of single-wall construction.

This section would apply where potable water was indirectly heated by the solar energy system. Section M2301.6.2 requires NSF 61 compliance for pipe, fittings and valves in a system that directly heats potable water as this is the same requirement for pipe, fittings and valves that the plumbing code requires for the hot water distribution system.

Section P2902.5.5 is modified as the section has been unclear for many cycles. Some have interpreted the existing section to require a backflow preventer on the cold water supply to any water heater that has a solar energy water heating system connected to the water heater. This makes no sense for a system that directly heats the water for distribution to the potable hot water distribution system. The section is modified to make the language address where the backflow preventer is needed (only for connections to solar collector circulation loop piping of indirect heating systems).

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar water heating systems are provided, this proposal may increase the cost of construction.

2301.6 (NEW) #2-RM-HALL-THOMPSON-SEPHCAC.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The subject of backflow protection does not belong in this part of the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee and Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair request Approval as Modified by this Public Comment.

Replace proposal as follows:

Add new text as follows:

M2301.6 Solar systems for heating potable water. Where a solar energy system heats potable water to supply a potable hot water distribution system, the solar energy system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

M2301.6.1 Indirect systems. Heat exchangers that are components of indirect heating systems shall comply with Section P2902.5.2.

M2301.6.2 Direct systems. Where potable water is directly heated, pipe, fittings, valves and other components that are in contact with the potable water in the solar heating system shall comply with the requirements of Chapter 29.

Revise as follows:

P2902.5.5 Solar systems. ~~The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer.~~

> ~~**Exception:** Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.~~

P2902.5.5 Solar thermal systems. Where a solar energy system heats potable water to supply a potable hot water distribution or a other type of heating system, the solar energy system shall be in accordance with Section P2902.5.5.1or P2902.5.5.2 as applicable.

P2902.5.5.1 Indirect systems. Water supplies of any kind shall not be connected to the solar heating loop of an indirect solar water heating system. This requirement shall not prohibit the presence of inlets or outlets on the solar heating loop for the purposes of servicing the fluid in the solar heating loop.

P2902.5.5.2 Direct systems. Where a solar water heating system directly heats potable water for a potable water distribution system, the pipe, fittings, valves and other components that are in contact with the potable water in the system shall comply with the requirements of Chapter 29.

Where a solar water heating system directly heats water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a backflow preventer with intermediate atmospheric vent complying with ASSE 1012. Where a solar water heating system directly heats water for a system other than a potable water distribution system and that system will have chemicals added, a potable water supply connected to such system shall be protected by a reduced pressure principle backflow preventer complying with ASSE 1013.

Commenter's Reason: This public comment changes the new section in the mechanical code part of the IRC to simply point to appropriate sections of the plumbing code to ensure that the solar system designer and installer don't miss these important plumbing code requirements. The modification for Section P2902.5.5 stays the same as the original proposal as it is fixing a problem recognized long ago. The plumbing code committee is not nearly as familiar with solar systems as the people who are aiding and supporting the SEHPCAC on this topic of solar thermal systems. Thus, including this plumbing code section in this proposal and public comment is appropriate.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Public Comment 2:

Lorraine A Ross, Intech Consulting Inc, representing The Dow Chemical Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

M2301.6 Solar thermal systems for heating potable water. Where a solar thermal ~~energy~~ system heats potable water to supply a potable hot water distribution system, the solar thermal ~~energy~~ system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

M2301.6.1 Indirect systems. Heat exchangers that are components of indirect solar thermal heating systems shall comply with Section P2902.5.2.

M2301.6.2 Direct systems. Where potable water is directly heated by a solar thermal system. The pipe, fittings, valves and other components that are in contact with the potable water in the solar heating system shall comply with the requirements of Chapter 29.

~~**M2301.6.2 Direct systems.** Where potable water is directly heated, the pipe, fittings and valves between the solar collectors and the hot water storage tanks shall comply with NSF 61.~~

Revise as follows:

P2902.5.5 Solar thermal systems. Where a solar thermal system heats potable water to supply a potable hot water distribution or any other type of heating system, the solar thermal system shall be in accordance with Section P2902.5.5.1, P2902.5.5.2 or P2902.5.5.3 as applicable.

~~**P2902.5.5 Solar systems.** Where a potable water supply is connected to the solar collector circulation loop piping of an indirect solar water heating system and chemicals are not used in the circulation loop piping, a backflow preventer in accordance with ASSE 1012 shall be installed between the potable water system and the circulation loop piping. Where chemicals are used in the solar collector circulation loop piping, such backflow preventer shall be in accordance with ASSE 1013.~~

P2902.5.5.1 Indirect systems. Water supplies of any type shall not be connected to the solar heating loop of an indirect solar thermal hot water heating system. This requirement shall not prohibit the presence of inlets or outlets on the solar heating loop for the purposes of servicing the fluid in the solar heating loop.

P2902.5.5.2 Direct systems for potable water distribution systems. Where a solar thermal system directly heats potable water for a potable water distribution system, the pipe, fittings, valves and other components that are in contact with the potable water in the system shall comply with the requirements of Chapter 29.

P2902.5.5.3 Direct systems for other than potable water distribution systems. Where a solar thermal system directly heats water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a backflow

<u>preventer with an intermediate atmospheric vent complying with ASSE 1012. Where a solar thermal system directly heats chemically treated water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a reduced pressure principle backflow preventer complying with ASSE 1013.</u>

Commenter's Reason: This public comment clarifies that these sections pertain specifically to solar **thermal** energy systems. The new sections are added to the IRC Plumbing Chapter to clarify requirements for direct and indirect systems connected to potable or other than potable water distribution systems.

RM93-13

Final Action: AS AM AMPC____ D

RM95-13

M2302.2, M2302.2.1, M2302.2.2 thru M2302.2.2s.2.5 (New), M2302.2.2 thru M2302.4

Proposed Change as Submitted

Proponent: Adria Smith, Fountain Valley Fire Department, Representing the California Fire Chiefs Association; Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office (adria.smith@fountainvalley.org)

Revise as follows:

M2302.2 Requirements. The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.21 through ~~M2302.2.3~~ M2302.2.7 and NFPA 70.

M2302.2.1 Roof-mounted panels and modules. Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.

> **Exception:** Detached, nonhabitable structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.

M2302.2.2 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections M2302.2.2.1 through M2302.2.2.2.5.

M2302.2.2.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

M2302.2.2.2 Solar photovoltaic systems. Solar photovoltaic systems for shall comply with SectionsM2302.2.2.2.1 through M2302.2.2.2.5.

M2302.2.2.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

M2302.2.2.2.2 Hip roof layouts. Panels and modules installed on dwellings with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

> **Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.3 Single ridge roofs. Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.4 Roofs with hips and valleys. Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.5 Allowance for smoke ventilation operations. Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

Exception: Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

~~M2302.2.2~~M2302.2.3 Roof and wall penetrations. Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

~~M2302.2.3~~M2302.2.4 Ground-mounted panels and modules. Ground-mounted panels and modules shall be installed in accordance with Sections M2302.2.2 through M2302.2.3 and the manufacturer's instructions.

~~M2302.3~~M2302.2.5 Photovoltaic panels and modules. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~M2302.4~~M2302.2.6 Inverters. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

Reason: We propose to reproduce the applicable provisions of International Fire Code 605.11 into the International Residential Code to provide for uniform design and enforcement. Many jurisdictions currently provide enforcement of the solar photovoltaic power systems guidelines in International Fire Code Section 605.11, or other locally adopted provisions through the building department/official which typically do not enforce the International Fire Code. Furthermore, the intent to have these provisions reproduced into the International Residential Code is to afford local communities the ability to provide adequate enforcement without the reference to a different code or standard. (IFC 605.11.3.3 through 605.11.3.3.3 are not reproduced, such provisions are not applicable to one- and two-family dwellings or townhouses).

Cost Impact: This proposal will not increase the cost of construction; these provisions are currently contained in the IFC.

M2302.2-RM-SMITH-REINERTSON.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Modify the proposal as follows:

M2302.2 Requirements. The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.21 through M2302.2.7 and NFPA 70.

M2302.2.1 Roof-mounted panels and modules. Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.

~~**Exception:** Detached, nonhabitable structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.~~

M2302.2.2 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections M2302.2.2.1 through M2302.2.2.2.5.

Exceptions:

1. Detached garages and accessory structures to one-and two-family dwellings and townhouses such as parking shade structures, carports, solar trellises, and similar structures.
2. Roof access, pathways and spacing requirements need not be provided where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed.

M2302.2.2.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

M2302.2.2.2 Solar photovoltaic systems. Solar photovoltaic systems shall comply with SectionsM2302.2.2.2.1 through M2302.2.2.2.5.

M2302.2.2.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

M2302.2.2.2.2 Hip roof layouts. Panels and modules installed on dwellings with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.3 Single ridge roofs. Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.4 Roofs with hips and valleys. Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.5 Allowance for smoke ventilation operations. Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

Exception: Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

M2302.2.3_ Roof and wall penetrations. Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

M2302.2.4_ Ground-mounted panels and modules. Ground-mounted panels and modules shall be installed in accordance with Sections M2302.2.2 through M2302.2.3 and the manufacturer's instructions.

M2302.2.5 Photovoltaic panels and modules. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

M2302.2.6 Inverters. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

Committee Reason: Same reason as for RM94-13

Assembly Action: Approved as Modified

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified by the Floor and public comments were submitted.

Public Comment 1:

Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office; John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA); Adria Smith, Fountain Valley Fire Department, representing the California Fire Chiefs Association; And Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION 324
SOLAR ENERGY SYSTEMS

~~M2302.2.2~~ R324.3.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections ~~M2302.2.2.1~~ R324.3.3.1 through ~~M2302.2.2.2.5~~ R324.3.3.2.5.

Exceptions:

1. Detached garages and accessory structures, ~~to one-and two-family dwellings and townhouses~~ such as parking shade structures, carports, solar trellises, and similar structures.
2. Roof access, pathways and spacing requirements need not be provided ~~where an alternative ventilation method approved by the code official has been provided or~~ where the code official has determined ~~that vertical ventilation techniques~~rooftop operations will not be employed.

~~M2302.2.2.1~~ R324.3.3.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

M2302.2.2.2 ~~Solar photovoltaic systems~~Size and layout. Solar photovoltaic systems shall comply with Sections ~~M2302.2.2.2.1 through M2302.2.2.2.5.~~ R324.3.3.2.1 through R324.3.3.2.5.

~~M2302.2.2.2.1~~ R324.3.3.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

~~M2302.2.2.2.2~~ R324.3.3.2.2 Hip roof layouts. Panels and modules installed on ~~one- and two-family~~ dwellings with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

~~M2302.2.2.2.3~~ R324.3.3 Single ridge roofs. Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

~~M2302.2.2.2.4~~ R324.3.3.2.4 Roofs with hips and valleys. Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

~~M2302.2.2.2.5~~ R324.3.3.2.5 Allowance for smoke ventilation operations. Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

Exception: Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This public comment takes the photovoltaic access and pathways requirements approved by the assembly on RM95-13 and move them to the new Section R324 for Solar Energy Systems, specifically to a subsection of R324.3 Photovoltaic energy systems, which was proposed by RM98-13 Part II. This move is necessary since RM98-13, Part 1, if approved, deletes section M2302. Other than section renumbering, specific edits made in the public comment to the approved as amended language are as follows:

This public comment only includes those changes from the original proposal, M2302.2.2 to M2302.2.2.2.5, that specifically address access and pathways, as remaining provisions are not necessary due to previous committee action on RM98-13. Also, several unnecessary references to one- and two-family dwellings were removed since this is the IRC.

R324.3.3, Exception 2 - It is recognized that providing access and pathways for rooftop photovoltaic systems is a significant firefighter safety issue if they are likely to be deployed on a rooftop during firefighting operations. However many local fire departments have policies in place to not allow rooftop operations. This exception will waive all access, pathway and spacing requirements for rooftop photovoltaic systems if the code official has determined that rooftop operations will not be deployed in the jurisdiction, which should be determined in consultation with the local fire chief.

R324.3.3.1 – No changes from approved as modified proposal.

R324.3.3.2 – Title changes from "Solar photovoltaic systems" to "Size and layout" to better reflect the requirements.

R324.3.3.2.1 to R324.3.3.2.5 – No changes from approved as modified proposal.

This public comment received input from several interested parties, including the fire service and industry. As stated by the Fire Code Committee on the IBC/IFC companion proposal, "The proposal also represents a successful collaborative effort between the fire service and the solar energy stakeholders."

Public Comment 2:

Douglas Smith, Kaysville City, Utah, representing Utah Chapter ICC, requests Disapproval.

Commenter's Reason: Proposal RM95 should be disapproved because its provisions are too restrictive for residential photovoltaic systems and has flaws in its provisions. The Committee originally disapproved RM95 which has excessive provisions for roof access, array size, and requiring access for smoke ventilation techniques. The Committee's reason for disapproval was as such: "The proposed text is overkill for residential buildings and is more commercial property related. The text would prohibit PV installations on homes." However, the Committee's decision was overturned and the proposal was modified and approved by assembly action. The Committee had it right to disapprove such restrictive requirements and are justified in their reason for doing so, but the assembly modification from the floor has also shown some flaws in that Section M2302.2.4 in the modification requires that all ground-mounted panels and modules meet the same requirements as those located on the roof. These requirements that *ground-mounted* systems must follow, as noted in the text, include: *roof* access and pathways, *roof* access points, *hip roof* layouts, single ridge *roofs*, *roofs* with hips and valleys, allowance for smoke ventilation requirements (at the *roof*), and *roof* penetrations. To require ground-mounted systems to meet the same requirements for those on the roof does not make any sense. From this we can see that when writing code, modifications from the floor is not good practice and this is evident here, which further justifies disapproving RM95 altogether.

There are some portions of this proposal that already exist and are word for word in the 2012 IRC, such as: M2302.2 Requirements, M2302.2.1 Roof-mounted panels and modules, M2302.2.3 Roof and wall penetrations, M2302.2.4 Ground-mounted panels and modules (except that proposal RM95 states they also must meet the new roofing requirements), M2302.2.5 Photovoltaic panels and modules, and M2302.2.6 Inverters. All these noted sections would remain as worded in the 2012 IRC (other than M2302.2.4) if RM95 is disapproved and would not be effected other than by numbering of sections.

Disapproval of RM95 would mean that all its excessive requirements for roof access, array size, roof venting, and the requirements for ground-mounted systems meeting the roofing requirements would all be kept out of the IRC. The Committee had it right the first time, RM95 needs to be disapproved.

RM95-13

Final Action: AS AM AMPC____ D

RM97-13, Part II
M2302

***NOTE:** PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.*

Proposed Change as Submitted

Proponents: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (jsmirnow@seia.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART II – IRC- BUILDING

Revise as follows:

SECTION M2302
PHOTOVOLTAIC SOLAR ENERGY SYSTEMS

M2302.1 General. This section provides for the design, construction, installation, alteration, and repair of photovoltaic equipment and systems.

M2302.2 General ~~R~~requirements. The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections ~~M2302.2.1~~ M2302.3 through ~~M2302.2.3~~ M2302.8 and NFPA 70.

~~M2302.2.1~~ M2302.3 Roof-mounted ~~panels and modules~~ photovoltaic panel systems. Rooftop-mounted photovoltaic panel systems shall be designed in accordance with this section. ~~The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

M2302.3.1 Structural requirements. Rooftop-mounted photovoltaic panel systems shall be designed in accordance with the *International Building Code* to support the system and withstand applicable loads. The roof shall be constructed to support the loads imposed by rooftop-mounted photovoltaic panel systems in accordance with Chapter 8 of this code or the *International Building Code.*

M2302.3.1.1 Wind load. Rooftop-mounted photovoltaic panel systems shall be designed for wind load in accordance with the *International Building Code* and ASCE 7, using an effective wind area in accordance with ASCE 7.

M2302.3.1.2 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for live load L_R for the load case when the photovoltaic panel system is not present.

M2302.4 Building integrated photovoltaic systems. Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section R905.16.

~~**M2302.2.2**~~ **M2302.5 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9. ~~to prevent entry of water, rodents, and insects.~~

~~**M2302.2.3**~~ **M2302.6 Ground-mounted** ~~**panels and modules.**~~ **photovoltaic panel systems.** Ground-mounted ~~panels and modules~~ photovoltaic panel systems shall be designed in accordance with the *International Building Code* and installed in accordance with the manufacturer's instructions.

~~**M2302.3**~~ **M2302.7 Photovoltaic panels and modules.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~**M2302.4**~~ **M2302.8 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

New definitions are added to provide clarity in requirements for photovoltaic systems.

Sections are re-numbered for better flow.

The sentence that references "roof mounted solar collectors that serve as a roof covering" is relocated into its own section and revised to clarify the requirements for Building Integrated Photovoltaic (BIPV) systems.

The sentence that references "noncombustible materials or fire-retardant treated wood" is deleted, as it is obsolete. Photovoltaic panel systems are constructed entirely of noncombustible components, other than seals between the glass panels and frames.

The first sentence of M2302.3.1 clarifies the system of hardware that becomes the mounting system for rooftop-mounted photovoltaic panel systems must be qualified by methods found in the International Building Code. There are no applicable provisions found in the International Residential Code for these systems of mounting hardware. These mounting systems must be qualified by calculations or physical testing, as prescribed in the IBC. New definitions are needed to provide this clarity.

The second sentence of M2302.3.1 clarifies the roof system must be checked or designed to support the resultant loads imposed on it by the mounting system of the photovoltaic panel system. This check can be accomplished by using appropriate span tables in IRC Chapter 8, or by structural analysis according to IBC provisions.

A new section on wind load is added for guidance to appropriate codes and standards where wind design provisions are found. Effective Wind Area is defined in ASCE 7-10 Section 26.2. Effective Wind Area is also referenced in Footnote a of Table R301.2(2) of this code. Effective Wind Area used in design of photovoltaic systems must be consistent with the definition found in ASCE 7 in order to be compatible with the wind design calculation methods found in ASCE 7.

A new section on roof live load is added to clarify provisions already formalized in Final Action for the 2015 IBC, with some modifications as appropriate for one- and two-family dwellings. In one load case, roof live load need not be modeled in the area(s) of the roof covered by PV panels, as nobody will be walking on top of the panels or on the roof area covered by the panels. In another load case for new construction, the code-prescribed roof live load must be modeled as if the photovoltaic panels are not present.

The section on ground-mounted systems is revised to clarify that design provisions applicable to ground mount installations are found in the IBC and not found within the IRC.

Cost Impact: This proposal will reduce construction costs.

M2302.2-RM-CAIN-SMIRNOW.DOC

Committee Action Hearing Results

PART II – IRC – Building
Committee Action: Approved as Modified

Replace the proposal as follows:

R324.3.1.1 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for live load L_R for the load case when the photovoltaic panel system is not present.

Committee Reason: Approval was based upon the proponent's published reason and the modification. The modification clarifies how to design the PV system for roof live load and correlates with previous action on RM98-13, Part II.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Smirnow and Joseph H. Cain, P.E, representing Solar Energy Industries Association (SEIA), request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R324.3.1.1 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the area(s) covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. ~~The exclusion of the roof live load in the area(s) covered by the panels does not preclude the design of building roofs from being designed for roof live load requirements for the loading condition where the photovoltaic panel system may be removed or not installed.~~ <u>Roof structures that provide support for photovoltaic panel systems shall be designed for live load L_R for the load case where the photovoltaic panel system is not present.</u>

Commenter's Reason: The purpose of this proposal is to correct a mistake in the SEIA Floor Modification only.

Proposal RM97-13 Part II was Approved as Modified by unanimous vote of the IRC-Building Committee. The Floor Modification submitted by the Solar Energy Industries Association (SEIA) was to strike out all sections other than the section on Roof live load, with intent to keep the language in the Roof live load section unchanged. SEIA testimony to the IRC-Building Committee included statements that the language in this remaining section was unchanged from the Monograph.

The Floor Modification also revised the section number to correlate with the language approved by the IRC-Building Committee under RM98-13 Part II.

After the committee vote, ICC staff recognized that the SEIA Floor Modification inadvertently and erroneously reintroduced old language in the last sentence that was revised prior to publishing the Group B Monograph. This was never our intent. This proposal strikes out the erroneous last sentence inadvertently reintroduced in the Floor Modification, and replaces it with the correct last sentence as published in the Monograph. This will restore clarity for readers of the IRC.

Further to this correction, note the correct last sentence – as included in this Public Comment – was inadvertently published in the Report on Committee Hearings, even though the last sentence in the Floor Modification was incorrect. An Errata Update is expected that will correct the record by showing the Floor Modification last sentence, even though it was incorrect. This Public Comment will restore the correct last sentence, as shown in the Monograph.

RM97-13, Part II

Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

RM97 – 13, Part I
M2302

Proponents: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (jsmirnow@seia.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IRC- MECHANICAL

Add new definitions as follows:

<u>**BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.</u>

<u>**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, designed to generate DC power when exposed to sunlight.</u>

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

Revise as follows:

PHOTOVOLTAIC ~~MODULES/~~SHINGLES. A *roof covering* ~~composed of flat-plate photovoltaic modules fabricated into shingles.~~ that resembles shingles and that incorporates photovoltaic modules.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

New definitions are added to provide clarity in requirements for photovoltaic systems.

Sections are re-numbered for better flow.

The sentence that references "roof mounted solar collectors that serve as a roof covering" is relocated into its own section and revised to clarify the requirements for Building Integrated Photovoltaic (BIPV) systems.

The sentence that references "noncombustible materials or fire-retardant treated wood" is deleted, as it is obsolete. Photovoltaic panel systems are constructed entirely of noncombustible components, other than seals between the glass panels and frames.

The first sentence of M2302.3.1 clarifies the system of hardware that becomes the mounting system for rooftop-mounted photovoltaic panel systems must be qualified by methods found in the International Building Code. There are no applicable provisions found in the International Residential Code for these systems of mounting hardware. These mounting systems must be qualified by calculations or physical testing, as prescribed in the IBC. New definitions are needed to provide this clarity.

The second sentence of M2302.3.1 clarifies the roof system must be checked or designed to support the resultant loads imposed on it by the mounting system of the photovoltaic panel system. This check can be accomplished by using appropriate span tables in IRC Chapter 8, or by structural analysis according to IBC provisions.

A new section on wind load is added for guidance to appropriate codes and standards where wind design provisions are found. Effective Wind Area is defined in ASCE 7-10 Section 26.2. Effective Wind Area is also referenced in Footnote a of Table R301.2(2) of this code. Effective Wind Area used in design of photovoltaic systems must be consistent with the definition found in ASCE 7 in order to be compatible with the wind design calculation methods found in ASCE 7.

A new section on roof live load is added to clarify provisions already formalized in Final Action for the 2015 IBC, with some modifications as appropriate for one- and two-family dwellings. In one load case, roof live load need not be modeled in the area(s) of the roof covered by PV panels, as nobody will be walking on top of the panels or on the roof area covered by the panels. In another load case for new construction, the code-prescribed roof live load must be modeled as if the photovoltaic panels are not present.

The section on ground-mounted systems is revised to clarify that design provisions applicable to ground mount installations are found in the IBC and not found within the IRC.

Cost Impact: This proposal will reduce construction costs.

PART I – IRC – Mechanical
Committee Action: **Disapproved**

Committee Reason: The proponent asked for disapproval because the definitions were addressed in other proposals.

Assembly Action: **None**

RM98-13, Part II
R902, R905, R908 (New)

NOTE: *PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART II IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.*

Proposed Change as Submitted

Proponent: Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY THE IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART II – IRC- BUILDING

SECTION R902
~~ROOF~~ FIRE CLASSIFICATION

Revise as follows:

R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in ~~areas~~ jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line. Classes A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E 108.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 oz/ft^2 copper sheets installed over combustible decks.

R902.3 Building integrated photovoltaic product. Building integrated photovoltaic products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with Section R902.1.

R902.4 Rooftop mounted photovoltaic panels and modules. Rooftop mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

SECTION R905
REQUIREMENTS FOR ROOF COVERINGS

R905.16 Photovoltaic ~~modules/~~shingles. The installation of photovoltaic ~~modules/~~shingles shall comply with the provisions of this section.
R905.16.1 Material standards. Photovoltaic ~~modules/~~shingles shall be listed and labeled in accordance with UL 1703.

R905.16.2 Attachment. Photovoltaic ~~modules/~~shingles shall be attached in accordance with the manufacturer's installation instructions.

R905.16.3 Wind resistance. Photovoltaic ~~modules/~~shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic ~~modules/~~shingles shall comply with the classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic ~~modules/~~shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

SECTION R908
ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

R908.1 General. The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code, the *International Fire Code* and *NFPA 70*.

R908.1.1 Material standards. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

R908.1.2 Structural requirements. Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable loads in accordance with Chapter 3. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8.

R908.1.3 Installation. Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's instructions. Roof penetrations shall be flashed and sealed in accordance with this chapter.

Add new text as follows:

SECTION 324
SOLAR ENERGY SYSTEMS

R324.1 General. Solar energy systems shall comply with the provisions of this section.

R324.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Chapter 23 and the International Fire Code.

R324.3 Photovoltaic solar energy systems. Photovoltaic energy systems shall be designed and installed in accordance with this section, the International Fire Code and NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

R324.3.1 Rooftop mounted photovoltaic systems. Rooftop mounted photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with Section 908.

R324.3.2 Building integrated photovoltaic systems. Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section 905.

R324.3.2.1 Photovoltaic shingles. Photovoltaic shingles shall comply with Section R905.16.

R324.4 Ground mounted photovoltaic systems. Ground mounted photovoltaic systems shall be designed and installed in accordance with Section R301.

R324.4.1 Fire Separation distances. Ground mounted photovoltaic systems shall be subject to the fire separation distance requirements determined by the local jurisdiction.

Reason: Currently, provisions for solar energy systems are sprinkled throughout the International Residential Code. Furthermore, there are also significant gaps, many of which were debated and approved in the 2015 *International Building Code* development process. This proposed change consolidates and organizes these provisions, with necessary section revisions, and section additions, in an easily used format that also sets the stage for easy integration of code requirements for new solar energy technology and applications as they emerge in the market. The following is an explanation of each new and revised section pertinent to the newly proposed Section R324 Solar Energy Systems:

1. **Chapter 2 New Definitions Section R202:**
   Four definitions are added for BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT, PHOTOVOLTAIC MODULE, PHOTOVOLTAIC PANEL and PHOTOVOLTAIC PANEL SYSTEM. All of these definitions are necessary and were approved for inclusion in the 2015 *International Building Code*.
2. **Chapter 2 Revised Definition Section R202:**
   A revised definition for PHOTOVOLTAIC SHINGLES is proposed, which was also approved for inclusion in the 2015 *International Building Code*.
3. **Add new SECTION R324 SOLAR ENERGY SYSTEMS:**
   Chapter 3 is entitled Building Planning and therefore is an appropriate place to list the general provisions for installation of solar energy systems on buildings within the scope of the *International Residential Code.* Newly proposed Section 324 contains general provisions for solar energy systems and then, with subsections, serves as pointers to specific code requirements for solar energy systems based on type and location. This section is based upon requirements generally found in Chapter 23 which this proposal also revises. See below for details.
   Setting up this section will also allow easy inclusion for new solar energy system types and locations. For example, if there are building integrated photovoltaic wall systems, a new subsection can be created, with an appropriate reference to Chapter 7.
4. **Revise Section R902 Roof Classification:**
   This section has been renamed Fire Classification in order to clarify the subject of the section. Two new sections have been added to clearly identify the fire classification requirements for both building integrated photovoltaic products that serve as the roof covering and rooftop mounted photovoltaic panel systems. There is also a change to clarify Section 902.1, where the word “area” was changed to “jurisdiction” because there has been interpretation that the word “area” referred to is a place on the roof itself rather than a geographic area, such as the Urban Wildfire Interface Zone or other jurisdictional requirements for fire classified roofs. Section 902 is in place to prevent fire from spreading from rooftop to rooftop.
5. **Revise Section R902.16 Photovoltaic Shingles:**
   This section, along with the revised definition for photovoltaic shingles, has been editorially revised to match comparable changes approved in the 2015 *International Building Code*.
6. **Add new section R908 ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS:**
   This new section outlines specific requirements for rooftop photovoltaic panel systems installed on or above roof coverings. As shown, material standards, structural requirements and installation details for these systems is detailed.
7. **Revise CHAPTER 23 and delete Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS:**
   Chapter 23 is renamed as SOLAR THERMAL ENERGY SYSTEMS which limits the chapter to solar thermal energy systems only as identified in newly proposed R324.

8. **Delete Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS:**
   As shown in Item 7, Chapter 23 is limited to solar thermal energy systems only. Therefore, Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS is deleted. Photovoltaic energy systems are electrical in nature. Placing requirements for these systems in the Mechanical part of the code is illogical and was only added in the 2012 International Residential Code because there was no other available place. This proposal sets up a new section R324 in Chapter 3 Building Planning for all solar energy systems with pointers to the type of system that will be used on the building. Provisions for photovoltaic energy systems currently in Section M2302 have been moved as appropriate to the newly proposed R324 SOLAR ENERGY SYSTEMS.

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

M2302-RM-ROSS.DOC

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

PART II – IRC – Building
Committee Action: Approved as Modified

Modify the proposal as follows:

R908.1 General. The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code, ~~the *International Fire Code*~~ and *NFPA 70*.

R908.1.2 Structural requirements. Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

(Portions of proposal not shown remain unchanged)

Committee Reason: Approval was based upon the proponent's published reason and the modification. The modification deleted reference to the IFC and added the requirement that the PV system must be design for the gravity loads and the roof support system must be designed to support the PV system loads.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Lorraine A Ross, Intech Consulting Inc, representing The Dow Chemical Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R324
SOLAR ENERGY SYSTEMS

R324.1 General. Solar energy systems shall comply with the provisions of this section.

R324.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Chapter 23 ~~and the International Fire Code~~.

R324.3 Photovoltaic solar energy systems. Photovoltaic solar energy systems shall be designed and installed in accordance with this section~~, the International Fire Code~~ and NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

(Portions of approved proposal not shown remain unchanged)

Commenter's Reason: As stated in the Report of Hearing, RM 98 was approved based upon the proponent's published reason and the modification. The modification deleted reference to the IFC and added the requirement that the PV system must be designed for the gravity loads and the roof support system must be designed to support the PV system loads.

This public comment is a "clean-up" of Section R324 by deleting the reference to the IFC in conformance with the modification approved at the Dallas hearings. This Public Comment also editorially inserts the "R" designation to the section title and adds the word "solar" in the first sentence of R324.3 for clarity.

Public Comment 2:

Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office; John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA); Adria Smith, Fountain Valley Fire Department, representing the California Fire Chiefs Association; And Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION R324
SOLAR ENERGY SYSTEMS

R324.1 General. Solar energy systems shall comply with the provisions of this section.

R324.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Chapter 23 ~~and the *International Fire Code*~~.

R324.3 Photovoltaic ~~solar energy~~ systems. Photovoltaic ~~energy~~ systems shall be designed and installed in accordance with this section~~, the *International Fire Code*~~ and *NFPA 70*. ~~Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.~~

R324.3.1 Equipment listings. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

R324.4 ~~R324.3.1~~ Rooftop mounted photovoltaic systems. Rooftop mounted photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with Section R908 ~~908~~.

R324.5 ~~R324.3.2~~ Building integrated photovoltaic systems. Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section R905 ~~905~~.

R324.5.1 ~~R324.3.2.1~~ Photovoltaic shingles. Photovoltaic shingles shall comply with Section R905.16.

R324.6 ~~R324.4~~ Ground mounted photovoltaic systems. Ground mounted photovoltaic systems shall be designed and installed in accordance with Chapter 3 ~~Section R301~~.

R324.6.1 ~~R324.4.1~~ Fire Separation distances. Ground mounted photovoltaic systems shall be subject to the fire separation distance requirements determined by the local jurisdiction.

SECTION R908
ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

R908.1 General. The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with ~~the provisions of this code~~ this section, section R324, and *NFPA 70*.

~~**R908.1.1 Material standards.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.~~

R908.2 ~~R908.1.2~~ Structural requirements. Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

R908.3 ~~R908.1.3~~ Installation. Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's instructions. Roof penetrations shall be flashed and sealed in accordance with this chapter.

Commenter's Reason: This public comment cleans up the proposal as follows.

General – For consistency the term "photovoltaic systems" replaces "photovoltaic energy systems" and "photovoltaic panel systems".
R324.2 – Reference to the IFC was deleted since it does not include specific requirements for solar thermal systems.
R324.3 – Reference to the IFC was deleted to be consistent with R908.1.
R324.3.1 – A title was added to this section, which focuses on listing requirements. The listing requirements for photovoltaic panels and modules was moved from R908.1.1 to here because this is a more logical location, and since listing of these devices is also required for ground mounted systems.
R324.6 – The structural requirements were revised from Section R301.1 to Chapter 3 to be consistent with R908.2.
R908.1 – For the convenience of the code user a reference to Section R324 was added.
R908.1.1 – As previously mentioned, these requirements were moved to R324.3.1.

Public Comment 3:

Steve Orlowski, representing National Association Of Home Builders, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R324.3 Photovoltaic solar energy systems. Photovoltaic energy systems shall be designed and installed in accordance with this section~~, the International Fire Code~~ and NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This public comment correlates action taken by the committee when it approved the modification at the Dallas hearings. The proponent of the original code change submitted a modification deleting the reference to the International Fire Code, after the committee approved a code change that brought the requirements directly into the IRC. The committee failed to delete this additional reference to the IFC, in this section, because it was referenced in the errata which did not appear in the original monograph or in the modification that was approved.

RM98-13, Part II
Final Action: AS AM AMPC____ D

NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE

RM98 – 13, Part I
202, M2302

Proponents: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (jsmirnow@seia.org)

Proponent: Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY THE IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I - IRC- MECHANICAL

Add new definitions as follows:

SECTION 202
DEFINITIONS

BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules, and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete,environmentally protected unit consisting of solar cells,optics and other components,exclusive of a tracker, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of photovoltaic modules mechanically fastened together,wired,and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that convert solar radiation into electricity, including rack support systems.

Revise as follows:

PHOTOVOLTAIC ~~MODULES/~~SHINGLES. A *roof covering* ~~composed of flat-plate photovoltaicmodules fabricated into~~ resembles shingles and that incorporates photovoltaic modules.

CHAPTER 23
SOLAR THERMAL ENERGY SYSTEMS

Delete without substitution:

~~**SECTION M2302**~~
~~**PHOTOVOLTAIC SOLAR ENERGY SYSTEMS**~~

~~**SECTION M2302**~~
~~**PHOTOVOLTAIC SOLAR ENERGY SYSTEMS**~~

~~**M2302.1 General.** This section provides for the design, construction,installation, alteration, and repair of photovoltaic equipment and systems.~~

~~**M2302.2 Requirements.** The installation, inspection, maintenance,repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.2.1 through M2302.2.3 and NFPA 70.~~

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.~~

~~**M2302.2.3 Ground-mounted panels and modules.** Ground-mounted panels and modules shall be installed in accordance with the manufacturer's instructions.~~

~~**M2302.3 Photovoltaic panels and modules.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.~~

~~**M2302.4 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.~~

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

PART I – IRC – Mechanical
Committee Action: **Approved as Submitted**

Committee Reason: Approval was based upon the proponent's published reason. PV is not mechanical and does not belong in Chapter 23.

Assembly Action: **None**

RP1-13
P2502.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2502.1 Existing building sewers and building drains. ~~Existing *building sewers* and drains shall be used in connection with new systems when found by examination and/or test to conform to the requirements prescribed by this document.~~ Where the entire sanitary drainage system of an existing building is replaced, existing building drains under concrete slabs and existing building sewers that will serve the new system shall be internally examined to verify that the piping is sloping in the correct direction, is not broken, is not obstructed and is sized for the drainage load of the new plumbing drainage system to be installed.

Reason: Before the technical reasons for the changes in this section are provided, the PMGCAC wants to readers of PMGCAC proposals to understand that many of our proposals for changing the IRC are focused on language improvements and intent clarity that do not change the meaning of what the 2012 IRC (and earlier editions) have required. Much of the existing language in the plumbing chapters came from the old CABO codes. “Seasoned” code officials knew what this language intended and inspected based upon a wealth of knowledge gathered over the many years of development of those older codes. Our concern is for the newer code officials and inspectors who do not have this experience and more often than not, are being required to enforce the code just as it is written. If the code is not clear, a variety of interpretations result and all users of the code suffer the consequences. The code needs to actually state the intent in clear terms. Even though many people already “know” what is intended by a particular code section and don’t think it necessary to make any changes, the development of the codes needs to consider all people who use the codes whether they are experienced or a newcomer. We hope that the readers of the PMGCAC proposals will carefully consider and approve our “editorial proposals” towards making a better code for the future.

Technical reason for Section P2502.1:

Use of “and/or” and “when” in code text is undesirable code format. What kind of “test”? The phrase “requirements prescribed by this document” is vague. Overall, the application of this section is unclear. The revised language provides clear, prescriptive requirements.

Consider a few situations that happen to houses. 1) A slab-on grade house burns down or is wind damaged such that only the remaining slab foundation will be used to re-construct a new building. Re-use of the building drain would be desirable to avoid extensive slab rework. 2) A house is completely razed or the entire plumbing drainage system of a house needs replaced such that only the building sewer remains. Re-use of the building sewer would be desirable to avoid extensive costs and possible complications for replacing the sewer (such as crossing a public street to connect to the public sewer). Why tear out good, serviceable building drains and building sewers for the sake of replacing with new material? The only way to know if existing building drains and existing building sewers are serviceable is to internally examine the piping for problems.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no.1 on the PMGCAC IRC-P list.

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

P2502.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The required internal examination would increase the cost of construction that is not justified.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The original code language already required an "examination and/or test" for sewers and drains that are going to be "re-used". Thus, this proposal does not cause additional cost of construction. Because all the piping is below grade, how else could you examine the piping if not by video camera? Testing (assuming pressure testing) of the piping doesn't tell you if the pipe has back slope or obstruction issues. This section was originally put into the code because some code officials were forcing complete replacement of building drains below slabs and building sewers (and even some under concrete driveways and public streets) when a house was completely rebuilt. This section is being revised only to clarify what this section originally intended.

RP1-13
Final Action: AS AM AMPC____ D

RP2-13
P2502.2

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2502.2 Additions, alterations or repairs. Additions, *alterations*, renovations or repairs to a~~ny~~ plumbing system<u>s</u> shall conform to that required for a new plumbing system without requiring the existing plumbing system<u>s</u> to comply with all the requirements of this code. Additions, *alterations* or repairs shall not cause an existing system to become unsafe, insanitary or overloaded.

Minor additions, <u>minor</u> *alterations*, <u>minor</u> renovations ~~and~~ <u>or</u> <u>minor</u> repairs to <u>an</u> existing plumbing system~~s shall be permitted~~ <u>that are performed</u> in the same manner and arrangement as in the existing system <u>but do not comply with this code,</u> <u>shall not create a hazardous condition and shall require approval by the *building official*.</u> ~~, provided that such repairs or replacement~~ are ~~not hazardous~~ ~~and are *approved*~~ .

Reason: "Shall be permitted" is not mandatory code language. The existing second paragraph is really an exception to allow "old methods and arrangements", not compliant with the current code, to be used in certain situations that are determined to be not hazardous. For example, a drum trap on a bathtub is not allowed by current code. It's old technology but drum traps are not known to create a hazardous condition. Changing a defective drum trap over to a standard trap arrangement might prove to be very difficult and unnecessarily costly when a replacement with a new drum trap will work. An S-trap arrangement for an existing pedestal lavatory might be the only economical way to provide for a replacement trap to the lavatory because of the physical constraints. The previous S-trap installation worked successfully and is not a hazardous condition. The second sentence in this section provides appropriate relief for repair situations instead of forcing an extensive and costly event for what started off as a simple repair project. The revised language makes the intent clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no.2 on the PMGCAC IRC-P list.

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

P2502.2-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The term "minor" is not defined and is used too many times in the proposal. The committee believes that the phrase "shall be permitted" is mandatory language that is acceptable for the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: "Shall be permitted" is not mandatory code language. Granted, the phrase is used throughout the I-codes as if it was mandatory code language but the truth is that this phrase only means you are allowed to do something. Unless the code prohibits something, you are allowed to do anything you want without saying that you are permitted to do so. The phrase "shall be permitted" doesn't mandate anything and doesn't prohibit anything. This is unacceptable code language.

The term "minor" was added to alterations, renovations and repairs because there has been always the question as to whether "minor" was meant as an adjective for all those terms or just for additions. We believe "minor" applies to all those words. There is no definition for "minor" but that problem existed in the original code language. It is up to the code official to decide what is "minor" as it is difficult to prescribe what constitutes "minor" in every situation. This revised language does not change the intent of the original language. It just puts the intent in mandatory language code format.

RP2-13
Final Action: AS AM AMPC____ D

RP3-13
P2503.4, P2503.4.1 (New), P2503.4.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~**P2503.4 Building sewer testing.** The *building sewer* shall be tested by insertion of a test plug at the point of connection with the public sewer and filling the *building sewer* with water, testing with not less than a 10-foot (3048 mm) head of water and be able to maintain such pressure for 15 minutes.~~

P2503.4 Gravity-flow building sewer test. Gravity-flow *building sewer* piping shall be tested in accordance with Section P2503.4.1 or P2503.4.2. Plastic piping shall not be tested using air or gas.

P2503.4.1 Water test. The piping shall be filled with water. Additional water shall be forced into the piping to increase the pressure in the piping by not less than 10 feet of water column (4.3 psi) (30 kPa). The source of pressure shall be isolated and disconnected from the piping except where a standpipe is used to generate the test pressure. Where a standpipe is used to generate the test pressure, water shall not be added to the standpipe during the test observation period. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

P2503.4.2 Air test. The piping shall be pressurized with air to not less than 4.3 psi (30 kPa). The air pressure shall be retained in the piping and the air pressure source shall be disconnected from the piping. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

Reason: This section needs to apply *only* to gravity flow sewers to distinguish it from the testing requirements for forced flow sewers (another proposal by the PMGCAC. The testing requirements between the two types are vastly different.

Code language should not, in general, include unnecessary "instructions" for the performance of the work. For example, "insertion of a test plug at the point of connection to the…" is unnecessary as the requirement for pressurizing the piping automatically requires that the contractor make the necessary arrangements (such as plugging and capping) to be able to pressurize the piping. To the "public sewer" is inaccurate as a building sewer could terminate at a septic tank, a private sewer or a private waste treatment plant.

The existing code language requires that the "piping maintain the test pressure". This is archaic language because the piping doesn't "maintain" anything. What is intended is that the test pressure in the piping not decrease during the observation period. The code language is revised to more clearly state the condition for a successful test.

A common method for water testing is to attach a standpipe to the piping being tested and filling the piping and the standpipe with water so that the water in the standpipe produces the required test pressure in the piping. The test pressure is easily verified by measuring the height of the standpipe. A "loss of pressure" (indicating a leak) in the system *could* be determined by observing the water level in the standpipe. However, in many cases, observing the water level in the standpipe might require the inspector to climb a ladder to visually see the water level at the top of the standpipe. The inspector is now challenged as to how much of a drop in water level in the standpipe constitutes a test failure? At first, it might be easy to say "none". However, if a pressure gauge is connected to the system to determine pressure loss, the minimum "readability" of the gauge for this pressure range allows for *some* pressure loss (or drop in standpipe water level). For example, Section P2503.9 requires that the pressure gauge have increments of 0.1 psi. Therefore, the gauge can be read to an accuracy of half of the increment or 0.05 psi. In other words, where using a reasonably sized, typical dial pressure gauge, it would be very difficult to observe that the pressure gauge needle moved by an increment less than 0.05 psi. So, by reading a pressure gauge, the amount of pressure drop allowed in the system under test is 0.05 psi. This pressure converts to 1.4 inches of water column. So, theoretically, to be fair and equivalent to the reading of a pressure gauge (such as used for an air test), the water level in the test standpipe could drop 1.4 inches and still be considered acceptable. Some code officials will fail a water test on piping because of a *change in shape of the water meniscus in the standpipe*! This is not realistic, is unnecessarily restrictive and is not what is intended by the code. By requiring that a gauge be used for determining the success of a water test allows for the code official to remain in a safe location (not having to climb ladders) and provides for a reasonable allowance for leakage of a system that essentially experiences no pressure while in service.

Another way to pressurize the piping with water is to force water into the piping with a hydrostatic pump (usually a small hand pump). The current language doesn't seem to consider this method and some code officials might balk at this method just because they think the language requires a 10 foot standpipe full of water to generate the test pressure. The revised language is now open to allow for water pressurization by a pump (typically a hand pump) instead of a standpipe.

A new section for *air testing* of gravity flow sewers is added as there is no technical reason why air cannot be used as a test medium provided that the piping is not of plastic material. Note that the test pressure is 4.3 psi to be the pressure equivalent to 10 feet head of water. In other sections of the current code, air test pressures are stated as 5 psi. As test gauges are required (see Section P2903.9) to have increments of 0.1 psi, there is no need to 'round' the test pressure up to 5 psi so that the pressure can be read on a gauge. For other code sections that use the 5 psi for air testing, other proposals are being offered to change the test pressure to 4.3 psi. There is no need (and it doesn't make sense) to air test at 5 psi when water testing is only required at 4.3 psi (10 feet of water head).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 3 on the PMGCAC IRC-P list.

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

P2503.4-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal would increase cost because of additional labor needed to do the test. There is not adequate cost justification for this increase in cost.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify proposal as follows:

P2503.4 Gravity-flow building sewer test. Gravity-flow *building sewer* piping shall be tested in accordance with Section P2503.4.1 or P2503.4.2. Plastic<u>, concrete and vitrified clay</u> piping shall not be tested using air or gas.

Commenter's Reason: We don't understand the committee's reason as to why there would be additional labor to perform the test that has a gauge. Putting a test gauge on the system to be pressure tested is just a matter of have a fitting in place to attach the gauge. Putting a gauge in place for air testing isn't anything new so why would it be so much "additional labor" for attaching a gauge for a water test?

The important thing to realize is *that this language allows for water testing without the use of a 10-foot test head standpipe full of water!* The reasoning that proponents of RP4 used to support the elimination of any water test head pressure for sewers was that they were concerned about flooding the house if a test plug didn't hold. The water test method in this proposal allows for the use of hand hydrotest pump to generate the test pressure. By this method, if the test pressure "lets go", the release of water is very minimal - maybe a cup?

We don't agree with the committee that there would be an increase in cost because special gauges are now required. We believe that the committee was swayed by an opponent's testimony that this proposal *now* requires special test gauges that might be unobtainable and highly expensive. This is not true because the code has required that gauges used for testing meet Section P2503.8 ever since the 2003 edition of the IRC (and IPC). By now, all plumbing contractors should have the appropriate test gages at their shop or on the truck. This proposal did not add the specification for test gauges, it only points to the section that has required this type of gauge for 10 years. Installers use the same test gauges for air pressure tests for DWV systems. These gauges are not left at the site but are simply attached for the test observation period. These gauges are obtainable and are the same gauges used for air testing of building DWV system.

In this public comment, we are further modifying Section P2503.4 to add other types of sewer piping that must not be tested by air, that being concrete and vitrified clay. These products can become cracked during installation and applying air pressure could result in a pipe failure which could send out projectiles that could cause injury, not unlike what could happen with air testing of plastic piping.

RP3-13

Final Action: AS AM AMPC____ D

RP4-13
P2503.4

Proposed Change as Submitted

Proponent: Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors (garyk@ridgewayplumbing.com)

Revise as follows:

P2503.4 Building sewer testing. The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer and filling the building sewer with water <u>to the highest point thereof.</u>~~, testing with not less than a 10-foot (3048) head of water and be able to maintain such pressure for 15 minutes.~~ <u>The building sewer shall be watertight at all points. Forced sewer tests shall consist of pressurizing the piping to a pressure of not less than 5 psi (34.5 kPa) greater than the pump rating and maintaining such pressure for not less than 15 minutes. The forced sewer shall be watertight at all points.</u>

Reason: Subjecting a gravity house sewer to a 10-foot head is both unnecessary and impractical. By the time the building sewer is able to be connected, the plumbing fixtures have often already been installed. That means that both ends of the sewer line must be plugged off in order to prevent the house from flooding. Leaks on house sewers are rare, considering that most are constructed with plastic pipe, are typically short, and contain few fittings and joints. Public sewer mains and branch laterals are not similarly tested.

This revised text is identical to that found in the other model plumbing code (UPC). It acknowledges the difficulties associated with pressure testing house sewers. It would be appropriate for the IRC to adopt this proven method.

This proposal also adds language for testing forced sewers, identical to that found in the IPC.

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

P2503.14-RP-KOZAN.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This method of testing is a safer, more logical way to perform the testing.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify proposal as follows:

P2503.4 Building sewer testing. The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer<u>,</u> ~~and~~ filling the building sewer with water <u>and pressurizing the sewer to not less than 10-foot (3048 mm) head of water.</u> ~~to the highest point thereof.~~ <u>The test pressure shall not decrease during a period of not less than 15 minutes.</u> The building sewer shall be watertight at all points.

Forced sewer tests shall consist of pressurizing the piping to a pressure of not less than 5 psi (34.5 kPa) greater than the pump rating and maintaining such pressure for not less than 15 minutes. The forced sewer shall be watertight at all points.

Commenter's Reason: Certainly, gravity sewer testing with water at practically zero pressure is "safer" (because the house won't flood when testing with a 10 foot stand pipe full of water and a test plug blows out) BUT does the test really prove anything? We understand that in normal service, a gravity building sewer experiences no pressure. However, the 10 foot water head test pressure is necessary to determine *the mechanical integrity of the joints*. For example, the installation might have a joint that is just "stuck together" without a coupling being tightened (hubless) or solvent welded (plastic); or a glued joint that might have squeezed the pipe partially out of the fitting socket before setting up. A little ground movement along with some invasive tree roots are going to eventually cause a root-clogging problem at these weak joints. The purpose of the 10 foot test head is not to necessarily duplicate an actual in-service condition but to ensure a level of quality for the workmanship. The 10-foot test head has been in the code for decades and there is not any technical justification for lowering the test pressure.

Plumbing contractors are usually inventive enough to know how to protect their own, and their customer's interests by making sure that homes and buildings will not be flooded during a building sewer test.

Note, however, we prefer RP3 as modified by our public comment over RP4 because of the following shortcomings of this RP4 proposal:

1) A test pressure for a forced sewer of 5 psi greater than the pump pressure rating is unnecessary. The pump cannot develop any more pressure than its rating so why test at a higher pressure?
2) The proposed language implies that a successful test on the sewer is where no observed leaks are found. How does the code official do that when the trench is muddy or where it might have rained a short time ago? Does the code official need to get down in the trench and look for evidence of leakage?
3) Why shouldn't an air test be acceptable for those piping systems that are not plastic, concrete or vitrified clay? The code allows air tests for drain, waste and vent piping (not plastic) so why not for sewers?
4) The original proposal does not require a period of time for the gravity test.

This public comment is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

RP4-13

Final Action: AS AM AMPC____ D

RP6-13
P2503.5

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.5 ~~DWV~~ Drain, waste and vent systems~~s~~ testing. Rough-in and finished plumbing installations~~s~~ of drain, waste and vent systems shall be tested in accordance with Sections P2503.5.1 and P2503.5.2.

Reason: The use of acronyms in code text is undesirable. The section language needs to state what plumbing system requires testing because the section title is not code language. This is a simple editorial cleanup that doesn't change the intent or meaning of this section.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 5 on the PMGCAC IRC-P list.

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

P2503.5-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal is not necessary as acronyms are used in other parts of the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: This is a simple editorial cleanup of the language. We are perplexed as to why the committee didn't approve this because acronyms are generally problematic in code text.

RP6-13
Final Action: AS AM AMPC____ D

RP7-13
P2503.5.1, P2503.5.1.1 (New), P2503.5.1.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.5.1 Rough-in test ~~plumbing~~. ~~DWV~~ The rough-in piping for the drain, waste and vent systems~~s~~ shall be tested ~~on completion of the rough piping installation by~~ in accordance with Section P2503.5.1.1 or P2503.5.1.2 . Plastic piping shall not be tested using air or gas. ~~water or for piping systems other than plastic, by air with no evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough piping has been installed, as follows:~~

1. ~~Water test. Each section shall be filled with water to a point not less than 10 feet (3048 mm) above the highest fitting connection in that section, or the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.~~
2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.

P2503.5.1.1 Water test. The piping shall be filled with water. Additional water shall be forced into the piping to increase the pressure in the piping by not less than 10 feet (3048 mm) of water column (4.3 psi) (30 kPa). The source of pressure shall be isolated and disconnected from the piping except where a standpipe is used to generate the test pressure. Where a standpipe is used to generate the test pressure, water shall not be added to the standpipe during the test observation period. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

> **Exception:** Vent piping that is within 10 feet (3048) below the elevation of the termination of the vent piping above a roof shall only be required to be filled with water and shall not be required to be pressurized by 10 feet (3048 mm) of water column (4.3 psi) (30 kPa).

P2503.5.1.2 Air test. The piping shall be pressurized with not less than 4.3 psi (30 kPa) of air. The air pressure shall be retained and the source of air pressure shall be disconnected from the piping. ~~The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa).This shall be held without introduction of additional air for a period of 15 minutes.~~ The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

> **Exception:** The highest vent piping joint in a completed drain waste and vent system and the pipe above such point in the vent system shall not be required to be tested.

Reason: The existing section language has some convoluted language regarding a personnel safety-related prohibition, appears to allow testing using gases other than air which is equally dangerous to personnel, uses an acronym in the code language (an undesirable practice), has archaic terminology, fails to consider certain DWV piping arrangements that are now allowed by the code and, depending on a code official's interpretation, puts onerous and perhaps impossible demands on the inspector to visually inspect all of the pipe, fittings and connections for water leaks.

Water testing:

A common method for water testing is to attach a standpipe to the piping being tested and filling the piping and the standpipe with water so that the water in the standpipe produces the required test pressure in the piping. The test pressure is easily verified by measuring the height of the standpipe. A “loss of pressure” (indicating a leak) in the system *could* be determined by observing the water level in the standpipe. However, in many cases, observing the water level in the standpipe might require the inspector to climb a ladder to visually see the water level at the top of the standpipe. The inspector is now challenged as to how much of a drop in water level in the standpipe constitutes a test failure? At first, it might be easy to say “none”. However, if a pressure gauge is connected to the system to determine pressure loss, the minimum “readability” of the gauge for this pressure range allows for *some* pressure loss (or drop in standpipe water level). For example, Section P2503.9 requires that the pressure gauge have increments of 0.1 psi. Therefore, the gauge can be read to an accuracy of half of the increment or 0.05 psi. In other words, where using a reasonably sized, typical dial pressure gauge, it would be very difficult to observe that the pressure gauge needle moved by an increment less than 0.05 psi. So, by reading a pressure gauge, the amount of pressure drop allowed in the system under test is 0.05 psi. This pressure converts to 1.4 inches of water column. So, theoretically, to be fair and equivalent to the reading of a pressure gauge (such as used for an air text), the water level in the test standpipe could drop 1.4 inches and still be considered acceptable. Some code officials will fail a water test on piping because of a *change in shape of the water meniscus in the standpipe*! This is not realistic, is unnecessarily restrictive and is not what is intended by the code. By requiring that a gauge be used for determining the success of a water test allows for the code official to remain in a safe location (not having to climb ladders) and provides for a reasonable allowance for leakage of a system that essentially experiences no pressure while in service.

Another way to pressurize the piping with water is to force water into the piping with a hydrostatic pump (usually a small hand pump). The current language doesn’t seem to consider this method and some code officials might balk at this method just because they think the language requires a 10 foot standpipe full of water to generate the test pressure. The revised language is now open to allow for water pressurization by a pump (typically a hand pump) instead of a standpipe.

The exception for P2503.5.1.1 is provided to accommodate the age old method of just filling the completed piping system to the overflow point at the vent terminal above the roof. (This is the same allowance that is in the current section language). Vent piping, especially so near to the opening to the outdoors, experiences negligible pressure in actual service so testing at not less than “10 feet of water column” is not critical. Simply filling this section of vent piping with water is good enough as it has been for decades.

Air testing:

This proposal adds the prohibition of the use of gas for testing plastic piping systems as someone could claim that they were not using air for testing but gas (such as nitrogen or carbon dioxide) for testing--the hazard (explosion of the piping) is still the same.

The test pressure of “5 psi of air” was changed to 4.3 psi to be equivalent to 10 feet head of water as it doesn’t make sense to “penalize a system” with a higher test pressure just because of the test method chosen. The 5 psi air pressure was originally chosen because in the past, gauges with 1 psi increments were commonly used. Now, the code requires (Section P2503.9) that the pressure gauge have 0.1 psi increments so it is easily possible to pressurize with accuracy to 4.3 psi. There is no need (and it doesn’t make sense) to air test at 5 psi when water testing is only required at 4.3 psi (10 feet of water head).

Test instruments using mercury are rarely, if ever anymore, used for plumbing system testing. Because of the environmental issues associated with a mercury spill from such test instruments, references to this type of test apparatus should be eliminated. The exception to Section P2503.5.1.2 is provided so that contractors will not have to climb roofs (sometimes very steep and slick) to “cap off” a vent pipe for a test and then return to the roof to uncap the vent pipe after the test. Such work can be easily and safely performed in an attic space. In actual service, the vent system experiences negligible pressure at this point so testing of this final connection isn’t critical. Let’s not make the plumbers do something that we know is dangerous (accessing roofs).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 6 on the PMGCAC IRC-P list.

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

P2503.5.1-RP-HALL-PMGCAC

Committee Action Hearing Results

The following is errata that was not posted to the ICC website.

P2503.5.1 Rough-in test ~~plumbing~~. ~~DWV~~ The rough-in piping for the drain, waste and vent system~~s~~ shall be tested ~~on completion of the rough piping installation~~ ~~by~~ in accordance with Section P2503.5.1.1 or P2503.5.1.2 . Plastic piping shall not be tested using air or gas. ~~water or for piping systems other than plastic, by air with no evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough piping has been installed, as follows:~~

1. ~~Water test. Each section shall be filled with water to a point not less than 10 feet (3048 mm) above the highest fitting connection in that section, or the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.~~

2. ~~Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.~~

Committee Action: **Disapproved**

Committee Reason: The language in the proposal is more confusing than the existing text. The proposal prohibits a commonly used test and there is no technical justification for this.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: Perhaps the committee was confused by the presence of errata, that being item 2 being left in the proposal. The water and air testing requirements for were already in the code. No test method is being deleted. The proposal made the requirements into sub-sections of the main section and provided clear and consistent wording. The wording of these two sub-sections is consistent with what we proposed in RP3 for water and air testing for sewers. The reasons in the original proposal provide a clear understanding of why we are revising the language.

RP7-13
Final Action: AS AM AMPC____ D

RP8-13
P2503.5.1

Proposed Change as Submitted

Proponent: Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors (garyk@ridgewayplumbing.com)

Revise as follows:

P2503.5.1 Rough plumbing. DWV systems shall be tested on completion of the rough piping installation by water or for piping systems other than plastic, by air with no evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough piping has been installed, as follows:

1. Water test. Each section shall be filled with water to a point not less than ~~10~~ 5 feet (~~3048~~ 1524 mm) above the highest fitting connection in that section, or to the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.
2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 KPa) or 10 inches of mercury column (34 KPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.

Reason: When testing a DWV system, the actual head pressure is not nearly as critical as the visual nature of the test. 10-foot head tests are commonly verified by the inspector "shaking the stack." If water splashes out, the system is considered to be watertight. Mirrors and ladders are seldom used. Lowering the fill stack to 5 feet enables both the installer and the inspector to put eyeballs on the water level inside the pipe. Seeing is believing.

There is nothing magical about a 10-foot head. The reality is a 10-foot (4.34 psi) head test is unlikely to reveal any leaks or defects that would not be detected by a 5-foot (2.17 psi) head test. Many jurisdictions favor the 5-foot head test as superior overall to a 10-foot head test. Florida, for example, adopted the 5-foot head test statewide more than ten years ago. It is time for the IRC to recognize this common sense approach.

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

2503.5.1-RP-KOZAN.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is a good, common sense change because it is hard for inspectors to see the water level in a 10 foot tall standpipe.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Disapproval.

Commenter's Reason: With respect to ensuring integrity of the piping installation, we see no technical justification for lowering the test pressure. And with the water level in the test standpipe now being easily visible, then the inspector could interpret a slight change in the *meniscus* of the water as a reason to reject the installation. What if the water level drops by 1/8 inch over a 15 minute period? Is that reason enough for failure? Granted, the existing language of this section leaves the door open for such problems, but to lower the top of the test standpipe for easy visibility opens the door even wider for disputes. (Note that our RP7 proposal offers a way to make water tests fair for both parties).

The purpose of the 10 foot test head is not to necessarily duplicate an actual in-service condition but to ensure a level of quality for the workmanship. The 10 foot water head test pressure is necessary to determine the mechanical integrity of the joints. For example, the installation might have a joint that is just ‘stuck together’ without a coupling being tightened adequately (hubless) or solvent welded (plastic); or a solvent welded joint that might have squeezed the pipe partially out of the fitting socket before setting up. A 10 foot head will find more of these installation problems.

The 10 foot test head *could* be representative of a real condition in a building. Consider a home with a basement (or in Florida, a ground level garage under a raised first floor) with a building drain below the basement floor level, but no fixtures on that floor level. The sewer clogs and backs up to the lowest fixture on the first floor. The building drain and a portion of the stack in the basement (or Florida garage) are now under a pressure that exceeds 5 foot of water head.

The 10-foot test head has been in the code for decades and coincides with typical home construction having 8-foot ceiling heights. We can see no technical justification for lowering the test pressure.

This public comment is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

RP8-13

Final Action: AS AM AMPC____ D

RP9-13

P2503.5.2, P2503.5.2.1 (New), P2503.5.2.2 (New), P2503.5.2.2.1 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.5.2 Finished test ~~plumbing~~. After the plumbing fixtures ~~have been~~ are ~~set~~ installed, ~~and their~~ traps filled with water and any air admittance valves installed, a test in accordance with Section P2503.5.2.1 shall be performed. Where required by the *building official*, one or more tests in accordance with P2503.5.2.2 shall be performed. ~~their connections shall be tested and proved gas tight and/or water tight as follows:~~

P2503.5.2.1 Water leakage ~~tightness~~. ~~Each~~ Fixtures shall be operated while exposed piping, fixture and faucet connections are observed for leaks. The test shall be successful where there is not any evidence of water leakage. ~~filled and then drained. Traps and fixture connections shall be proven water tight by visual inspection.~~ This section shall not be construed as requiring the building official to witness the operation of all fixtures.

P2503.5.2.2 Gas leakage ~~tightness~~. Only when required by the ~~local administrative authority~~ *building official*, testing in accordance with Section P2503.5.2.2.1 or P2503.5.2.2.2 shall be performed. ~~a final test for gas tightness of the DWV system shall be made by the smoke or peppermint test as follows:~~

P2503.5.2.2.1 Smoke test. ~~Introduce~~ A pungent, thick smoke ~~into the system~~ shall be forced into the drainage, waste and vent system, on the downstream side of traps, using a pressure of 1 inch water column (249 Pa) or less. ~~When~~ After the smoke appears at the outdoor vent terminals, ~~such~~ the terminals shall be temporarily sealed to prevent smoke leakage and the piping shall be pressurized to 1-inch water column (249 Pa) by a continuous source of air. ~~and a pressure equivalent to a 1-inch water column (249 Pa) shall be applied and maintained~~ for a ~~test period of not less than 15 minutes~~. The test shall be successful where there is not any smoke observed inside the building during an observation period of 15 minutes. Smoke generating materials such as bombs, canisters and flares shall not be placed into the drain, waste and vent system piping.

P2503.5.2.2.2 Peppermint test. All but one outdoor vent terminal of the piping shall be temporarily sealed to prevent odor leakage. Two ~~Introduce 2~~ ounces (59 mL) of oil of peppermint shall be poured into the open outdoor vent terminal followed by ~~into the system. Add~~ 10 quarts (9464 mL) of hot water. ~~and seal all vent terminals~~. The vent terminal shall be temporarily sealed gas tight. The test shall be successful where the odor of peppermint is not detected in the building during an observation period of 15 minutes. ~~The odor of peppermint shall not be detected at any trap or other point in the system.~~ Persons who have performed the addition of oil and hot water to the system shall not enter the building until after the observation period.

Reason: This section has some convoluted language, some archaic terminology and fails to address certain important specifics of the test methods such as making sure air admittance valves are installed. The revised language makes the intent clear. The last sentence of Section P2503.5.2.1 allows the building official to randomly select (or select none) of the fixtures to operate during inspection so as to not waste precious time for inspection. The plumbing installer should have already performed a final leak test of all fixtures before inspection. The plumbing installer is responsible for finding and resolving any leaks before and after inspection. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 7 on the PMGCAC IRC-P list.

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

P2503.5.2-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal is too lengthy. Plumbers know what they are doing and don't need a handbook to instruct them on how to do testing.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The only lengthy parts of the proposal were the sections about gas leakage tests (smoke and peppermint testing). Those tests are so rarely used (mostly for resolving problems after the building is occupied) that there really does need to be specifics on how to do these tests properly. Many plumbing contractors might not need to do such tests for many, many years so they will be unfamiliar with how to do them correctly when the time comes. Building officials might also be unfamiliar with how such tests are to be correctly performed.

The "everyday parts" of this proposal are very short (Sections P2503.5.2 and P2503.5.2.1) and are no longer than the existing code. The key updates are that air admittance valves are to be installed and that "each" fixture does not have to be operated and observed by the building official – he or she can arbitrary pick any fixture to operate or not pick any. Ultimately, the plumbing contractor will be called by the builder or homeowner if there are any leaks after the building is occupied and will be responsible for repairing such problems. The code official's final inspection has more to do with making sure that fixtures are installed in a correct manner and that the required backflow protection is provided.

We are certain that the strike-out-and-underline format was really confusing to the committee. The following shows the final code format:

P2503.5.2 Finished test. After the plumbing fixtures installed, traps filled with water and any air admittance valves installed, a test in accordance with Section P2503.5.2.1 shall be performed. Where required by the *building official*, one or more tests in accordance with P2503.5.2.2 shall be performed.

P2503.5.2.1 Water leakage. Fixtures shall be operated while exposed piping, fixture and faucet connections are observed for leaks. The test shall be successful where there is not any evidence of water leakage. This section shall not be construed as requiring the building official to witness the operation of all fixtures.

P2503.5.2.2 Gas leakage. Only when required by the *building official*, testing in accordance with Section P2503.5.2.2.1 or P2503.5.2.2.2 shall be performed.

P2503.5.2.2.1 Smoke test. A pungent, thick smoke shall be forced into the drainage, waste and vent system, on the downstream side of traps, using a pressure of 1 inch water column (249 Pa) or less. After the smoke appears at the outdoor vent terminals, the terminals shall be temporarily sealed to prevent smoke leakage and the piping shall be pressurized to 1-inch water column (249 Pa) by a continuous source of air. The test shall be successful where there is not any smoke observed inside the building during an observation period of 15 minutes. Smoke generating materials such as bombs, canisters and flares shall not be placed into the drain, waste and vent system piping.

P2503.5.2.2.2 Peppermint test. All but one outdoor vent terminal of the piping shall be temporarily sealed to prevent odor leakage. Two ounces (59 mL) of oil of peppermint shall be poured into the open outdoor vent terminal followed by 10 quarts (9464 mL) of hot water. The vent terminal shall be temporarily sealed gas tight. The test shall be successful where the odor of peppermint is not detected in the building during an observation period of 15 minutes. Persons who have performed the addition of oil and hot water to the system shall not enter the building until after the observation period.

RP9-13

Final Action: AS AM AMPC____ D

RP10-13
P2503.7, P2503.7.1 (New), P2503.7.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.7 Water~~-supply~~ service and distribution systems test~~ing~~. ~~Upon completion of~~ The water service piping system and water distribution piping system ~~-supply system~~ or ~~section of it~~, ~~system or portion completed~~ shall be tested ~~and proved tight under a water pressure of not less than the working pressure of the system or, for piping systems other than plastic, by an air test of not less than 50 psi (345 kPa).~~ in accordance with Section P2503.7.1 or P2503.7.2. ~~This pressure shall be held for not less than 15 minutes. The water used for tests shall be obtained from a potable water source.~~ Plastic piping shall not be tested using air or gas.

P2503.7.1 Water test. The piping shall be filled with potable water. The water in the piping system shall be pressurized to not less than the working pressure of the system. The pressure shall be retained and the source of pressure shall be isolated from the piping being tested. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with requirements of Section P2503.9.

P2503.7.2 Air test. The piping shall be pressurized with not less than 50 psi (345 kPa) of air. The pressure shall be retained in the piping and the source of air pressure shall be disconnected from the piping. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with requirements of Section P2503.9.

Reason: This section has some convoluted language, some archaic terminology and fails to address certain important specifics of the test methods. The revised language makes the intent clear. Compressed gas was added to the plastic piping prohibition because someone could claim that they were not using air. Some people might say “Why have a pressure gauge to check for leaks when testing with water? You’ll be able to see the leaks”. Consider a water service line in a muddy trench. Or it starts to rain on the trench. Or the water distribution system of a large multi-story house. Or the house is not rain tight and there is rainwater dripping everywhere. Does the building official want to go around checking for drips? That’s the plumbers responsibility if the system doesn’t hold pressure. The pressure gauge method for inspection provides a single point for building official to look at.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 8 on the PMGCAC IRC-P list.

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

P2507.5.7-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal is too lengthy. The language is better off being left alone because it will be consistent with the IPC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The existing section was expanded to separate the water and air testing requirements so the proposal does appear to be "lengthy". However, we do not feel that "too lengthy" is a valid reason to reject a proposal when the purpose of the proposal is to simply clarify the intent of rather convoluted existing code language. This proposal does not make any technical changes other than to require that the source of pressure be disconnected from the piping for the test.

The first section of the proposal is hard to read with strike-out-and-underline format. Here's what it will look like if approved:

P2503.7 Water service and distribution systems test. The water service piping system and water distribution piping system shall be tested in accordance with Section P2503.7.1 or P2503.7.2. Plastic piping shall not be tested using air or gas.

RP10-13

Final Action: AS AM AMPC____ D

RP12-13
P2602.1, P2602.2, Chapter 14

<u>Proposed Change as Submitted</u>

Proponent: Dan Buuck, National Association of Home Builders (NAHB); David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

SECTION P2602
INDIVIDUAL WATER SUPPLY AND SEWAGE DISPOSAL

P2602.1 General. The water-distribution and drainage system of any building or premises where plumbing fixtures are installed shall be connected to a public water supply or sewer system, respectively, if available. When either a public water supply or sewer system, or both, are not available, or connection to them is not feasible, an individual water supply or individual (private) sewage-disposal system, or both, shall be provided. <u>Individual water supplies shall be constructed in accordance with state and local laws or in accordance with ANSI/NGWA-01-07.</u>

P2602.2 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1):

1. Water supply systems shall be designed and constructed to prevent infiltration of floodwaters.
2. Pipes for sewage disposal systems shall be designed and constructed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

Add new standard to Chapter 14 as follows:

<u>National Ground Water Association</u>
<u>601 Dempsey Road</u>
<u>Westerville, OH 43081-8978</u>

<u>NGWA</u>

<u>ANSI/NGWA-01-07 Water Well Construction Standard</u>

Reason: The IRC currently refers the user to the IPC for requirements regarding well construction, as it does for all plumbing not addressed in the IRC (P2601.1). Does it make sense to have code language regarding wells when many states and counties have laws that regulate their construction? The provisions for wells in the IPC are also incomplete and spread out through several sections of the code making tracking difficult. This proposal is a simple change that clarifies where to go for well construction requirements—either your local regulations or an ANSI standard.

The Water Well Construction Standard is expected to complete the ANSI process and be published by the end of summer 2013.

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

P2602.1-RP-BUUCK-HALL-PMGCAC

Committee Action Hearing Results

For staff analysis of the content of ANSI/NGWA-01-07 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: This proposal fills in the gap where state or local law might not exist for private wells.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, CBO, National Association of Home Builders (NAHB) representing the National Association of Home Builders (NAHB) (dbuuck@nahb.org) and Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment

Modify the proposal as follows:

P2602.1 General. The water-distribution and drainage system of any building or premises where plumbing fixtures are installed shall be connected to a public water supply or sewer system, respectively, if available. When either a public water supply or sewer system, or both, are not available, or connection to them is not feasible, an individual water supply or individual (private) sewage-disposal system, or both, shall be provided. Individual water supplies shall be constructed in accordance with <u>the applicable</u> state and local laws ~~or~~<u>. Where the construction of individual water supplies is not regulated by state or local laws, such individual water supplies shall be constructed</u> in accordance with ANSI/NGWA-01-07.

Commenter's Reason: Although the proposal was approved as submitted at the committee action hearings in Dallas, some committee members felt the section needed additional language to clarify that the ANSI/NGWA standard could not preempt state and local laws. This public comment adjusts the language to require that NGWA-0-07 be the fallback requirement if there are no state or local laws controlling the construction of individual water supplies.

RP12-13
Final Action: AS AM AMPC____ D

RP13-13
P2603.2.1, P2603.2.1.1 (New), P2603.2.1.2 (New), P2603.2.1.3 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2603.2.1 Protection against physical damage. ~~In concealed locations where *piping*, other than cast iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 inches (38 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored and shall extend not less than 2 inches (51 mm) above sole plates and below top plates.~~ Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections P2603.2.1.1 through P2603.2.1.3.

Exception: Cast iron piping and galvanized steel piping shall not be required to be protected.

P2603.2.1.1 Piping through bored holes or notches. Where *piping* is installed through holes or notches in framing members and the piping is located less than 1 ½ inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend 2 inches (51 mm) to each side of the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend 2 inches (51 mm) above the bottom framing member and 2 inches (51 mm) below the top framing member.

P2603.2.1.2 Piping in other locations. Where the piping is located within a framing member and is less than 1 ½ inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 ½ inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

P2603.2.1.3 Shield plates. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage).

Reason: This proposal provides clear requirements of where shield plates are needed. Section P2603.2.1uses the term "light frame construction assemblies" to describe wall, floor and roof assembles that can be made up from either wood members or light frame, cold formed steel members.

Section P2603.2.1.1 covers applications where piping runs perpendicular to a framing member and passes through a bored hole or notch in the framing member. This text is nearly the same as what is currently in the IRC. If the piping is within 1 ½ inches of the face of the member where wall ceiling or floor membranes will be attached, then the piping is required to be protected by a shield pate that covers the width of the piping by the width of the framing member plus 2 inches on either side of the framing member. Protection of the piping on either side of the framing member is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member.

Section P2603.2.1.1 also covers the application where piping runs perpendicular to and penetrates top and bottom plates, or top and bottom tracks. Protection of the piping above the bottom framing member (or below the top framing member) is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping just outside of the framing member. The code fails to address the situation where piping is run within the C-channel of a metal stud or joist and it also fails to address piping run parallel to a framing member.

Section P2603.2.1.2 covers applications where the piping runs alongside of a framing member or in the case of a light frame, cold formed steel framing member, piping that runs parallel to the length of and within the framing member (in other words, within the channel section). If the piping is within 1 ½ inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield pate that covers the width of the piping by the length of piping that is within the 1 ½ inch proximity of the framing member's fastening face. Piping that is located behind the fastening face of the member and within 1 ½ inches of the fastening face of the member obviously needs protection from fastener penetration. Piping that is located adjacent to and within 1 ½ inches of the fastening face of the member needs protection because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member.

The opposition to this proposal for the IPC was related to the requirement to protect the length of piping that is run parallel to a framing member and within 1 ½ inches from the member face to which wall board will be screwed or nailed. The concern was expressed that it would be difficult to protect the pipe for its full length, making the assumption that the pipe ran from the bottom plate up through the top plate in walls. First of all, it is unlikely that an installer would install piping from plate to plate that close to the stud, since it would be nearly impossible to drill holes that close to the stud. Secondly, the obvious way to avoid installing protection for the pipe is to simply keep it at least 1 ½ inches away from the framing member. With a little planning, the installation of pipe protection could be easily avoided.

This proposal was approved for the 2015 IFGC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list.

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

P2603.2.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposed language would create more problems than it is trying to solve. In slab on grade construction where framing is installed after the piping installed, the plumber would have no control on the location of the framing with respect to the piping.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The same proposal was Approved as Submitted for both the Mechanical and Fuel Gas portions of the IRC. This proposal should be approved for consistency in the IRC.

RP13-13

Final Action: AS AM AMPC____ D

RP16-13
P2603.3

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~**P2603.3 Breakage and corrosion.** Pipes passing through concrete or cinder walls and floors, cold-formed steel framing or other corrosive material shall be protected against external corrosion by a protective sheathing or wrapping or other means that will withstand any reaction from lime and acid of concrete, cinder or other corrosive material. Sheathing or wrapping shall allow for movement including expansion and contraction of piping. The wall thickness of material shall be not less than 0.025 inch (0.64 mm).~~

P2603.3 Protection against corrosion. Metallic piping, except for cast iron, ductile iron and galvanized steel, shall not be placed in direct contact with steel framing members, concrete or masonry. Metallic piping shall not be placed in direct contact with corrosive soil. Where sheathing is used to prevent direct contact, the sheathing material thickness shall be not less than 0.008 inch (8 mil) (0.203 mm) and shall be made of plastic. Where sheathing protects piping that penetrates concrete or masonry walls or floors, the sheathing shall be installed in a manner that allows movement of the piping within the sheathing.

Reason: One clear intent of this code section is to protect metallic piping from direct contact with concrete, masonry, corrosive soils and cold formed steel framing members as direct contact could cause exterior corrosion of the piping. However, it is not clear exactly what the sentence “Sheathing or wrapping shall allow for movement including expansion and contraction of piping” is intended to mean. Committee comments from the 2012 IPC hearings on a similar proposal seem to indicate that where sheathing or wrapping (presumably with plastic materials) are used to protect a pipe passing through concrete (such as a pipe below a slab coming up through and cast in the slab), the sheathing must allow for some “give” between the pipe and the concrete or masonry.

The wall thickness of the sheathing material is in question. To our knowledge, no one is using this thick of material and jurisdictions are not enforcing the requirement for 0.025 inch (25 mils) thick material. Much thinner plastic sheathing materials are commonly being used across the country for decades without any reported adverse effects. Cast iron and ductile iron manufacturers recommend, for corrosive soil conditions, the use of either 0.008 inch thick low density polyethylene sheathing or 0.004 inch thick, high strength cross laminated polyethylene sheathing for corrosive soil conditions. For small metallic pipes such as copper tubing (1/2” to 1 ¼”) passing through concrete or masonry, plumbing supply houses normally stock 0.004 and .006 inch thick low density “flat tube” plastic sheathing materials and that is what is being used. To make it easy, requiring 0.008 inch thick material for all types of metallic piping is reasonable.

The revised language improves understanding what the code intends.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 10 on the PMGCAC IRC-P list.

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

P2603.3-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposed language is much more clear than the existing and allows thinner sheathing material which has been used without any problems for years.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Pennie L. Feehan, Pennie L. Feehan Consulting representing Copper Development Association (penniefeehan@me.com) requests Disapproval.

Commenter's Reason: The original code section referred to piping passing through foundations, floors, and walls. This proposal implies pipe incased in, supported by, or lying on will need protection. As an example, strapping or supporting horizontal pipe to a concrete wall would require protection. The cost of construction will be increased because of additional labor and materials to comply with this section. If the sheathing thickness is the issue, then that should be changed.

RP16-13

Final Action: AS AM AMPC____ D

RP19-13
P2605.1

Proposed Change as Submitted

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association representing the Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

TABLE P2605.1
PIPING SUPPORT

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
Cross-linked polyethylene (PEX) pipe, 1 inch and smaller	2.67 (32 inches)	10b
Cross-linked polyethylene (PEX) pipe, 1 ¼ inch and larger	4	10[b]

(Portions of table and footnotes not shown remain unchanged)

Reason: PEX tubing, like other materials currently in the table, is being made in larger diameters that are stiffer and require less support.

Cost Impact: None

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The code currently lacks support information for larger sizes of PEX pipe so this information is needed in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Larry Gill, IPEX USA LLC, requests Approval as Modified by this Public Comment.

TABLE P2605.1
PIPING SUPPORT

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
Cross-linked polyethylene (PEX) pipe, 1 inch and smaller	2.67 (32 inches)	10[b]
Cross-linked polyethylene (PEX) pipe, 1 ¼ inch and larger	4	10[b]
Polyethylene of Raised Temperature (PE-RT) pipe, 1 inch and smaller	2.67 (32 inches)	10[b]
Polyethylene of Raised Temperature (PE-RT) pipe, 1 ¼ inch and larger	4	10[b]

Commenter's Reason: Support values for PEX were added to the IRC and approved. PE-RT support spacing is already in the IRC but we need to make the above noted changes to clarify that there are different support spacing's for 1 inch and smaller and 1 ¼ inch and larger. If approved, the values for PEX and PE-RT would match.

RP19-13

Final Action: AS AM AMPC____ D

RP23-13
P2607.1, P2607.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2607.1 ~~**General**~~ **<u>Pipes penetrating roofs</u>.** <u>Where a pipe penetrates a</u> roof, <u>a flashing of lead, copper, galvanized steel or an *approved* elastomeric material shall be installed in manner that prevents water entry into the building.</u> Counterflashing <u>into the opening of pipe serving as a vent terminal</u> shall not ~~restrict~~ <u>reduce</u> the required internal cross-sectional area of <u>the vent pipe to less than the internal cross-sectional area of one pipe size smaller.</u> ~~any vent~~. ~~and exterior wall penetrations shall be made water tight. Joints at the roof, around vent pipes, shall be made water tight by the use of lead, copper or galvanized iron flashings or an *approved* elastomeric material.~~

Add new text as follows:

<u>**P2607.2 Pipes penetrating exterior walls.** Where a pipe penetrates an exterior wall, a waterproof sealant shall be applied at the joint between the wall and the pipe, on the exterior of the wall.</u>

Reason: The phrase "made water tight" is archaic language. The existing section needs to be broken into two sections for clarity. Additional wording makes the intent clear. Counterflashing will *always* reduce the inside cross-sectional area of the vent pipe so the issue is how much reduction is acceptable. An area that is not less than one pipe smaller seems reasonable.

The new section just separates the wall sealing requirement out of the previous section and makes the language clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 15 on the PMGCAC IRC-P list.

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

P2607.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposed language provides needed clarity on how large an opening is needed when peening over flashing into the vent termination.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Forest Hampton III, Oatey Co., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2607.2 Pipes penetrating exterior walls. Where a pipe penetrates an exterior wall, ~~a waterproof sealant shall be applied at the joint between the wall and the pipe, on the exterior of the wall.~~ a waterproof seal shall be made on the exterior of the wall by one of the following methods:

1. A waterproof sealant applied at the joint between the wall and the pipe.
2. A flashing of an approved elastomeric material.

Commenter's Reason: Flat sidewall elastomeric flashings that are made from equivalent materials as elastomeric roof flashing are available in the field for use in sidewall penetrations.

RP23-13

Final Action: AS AM AMPC____ D

RP26-13
P2609.3

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2609.3 Plastic pipe, fittings and components. All plastic pipe, fittings and components, including brass fittings, shall be third-party certified as conforming to NSF 14.

Reason: Testing and certification requirements were added to NSF 14 to provided dezincification resistant brass fittings for plastic piping systems. NSF 14 was changed to reflect these requirements as a result of widespread failure of brass fittings and a large number of law suits across the United States. This proposed change to the IRC is required to update the language in the code to be consistent with changes to NSF 14. The current language could be interpreted to mean that only plastic fittings need comply with NSF 14, which the CAC does not believe is the intent.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 76 (added after 15DEC2012) on the PMGCAC IRC-P list.

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

P2609.3-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The existing language already includes fittings for plastic pipe. This change singles out one type of material.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: We believe that the issue of dezincification of brass components is a serious issue and that the code needs to require that brass fittings be dezincification resistant.

Public Comment 2:

Pennie L. Feehan, Pennie L. Feehan Consulting representing Copper Development Association (penniefeehan@me.com) requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2609.3 Plastic pipe, fittings and components. All plastic pipe, fittings and components, including ~~brass~~ copper alloy fittings, shall be third-party certified as conforming to NSF 14.

Commenter's Reason: Changing brass to copper alloy is consistent with other approved proposals. Dezincification testing and certification requirements were added to NSF 14 for plastic piping systems. NSF 14 was changed to reflect these requirements as a result of widespread failure of brass fittings and a large number of law suits across the United States. This proposed change to the IRC is required to update the language in the code to be consistent with changes to NSF 14.

RP26-13

Final Action: AS AM AMPC____ D

RP31-13

P2701.2 (New), P2705.1, P2705.1.1 (New), P2705.1.2 (New), P2705.1.3 (New), P2705.1.4 (New), P2705.1.5 (New), P2705.1.6 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2701.2 Fixture fitting mounting surfaces. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.1.

P2705.1 General. The installation of fixtures shall ~~conform~~ be in accordance with Sections P2705.1.1 through P2705.1.6. ~~to the following:~~

P2705.1.1 Floor-outlet and floor-mounted fixtures. ~~1.~~ Floor-mounted ~~or~~ and floor-outlet fixtures shall be ~~secured to the drainage connection and~~ fastened to the floor or fastened to a water closet flange that is fastened to the floor. ~~where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, brass or other corrosion-resistant material.~~ Fasteners shall be of corrosion-resistant material and shall be screws or bolts.

P2705.1.2 Wall-hung fixtures. ~~2.~~ Wall-hung fixtures shall be ~~rigidly~~ supported by the wall or where a fixture carrier is provided, supported by the carrier. The piping connected to the fixture shall not provide support for the fixture. ~~so that strain is not transmitted to the plumbing system.~~

P2705.1.3 Sealing required. ~~**3.** Where fixtures come in contact with walls and floors, the contact area shall be water tight.~~ Joints formed where fixtures come in contact with walls or floors shall be sealed water tight.

~~4. Plumbing fixtures shall be usable.~~

P2705.1.4 Clearances. ~~**5.** Water closets, lavatories and bidets~~. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. ~~There shall be~~ A clearance of not less than ~~a~~ 21-inches (533 mm) shall be provided in front of a water closet, lavatory or bidet to any wall, fixture or closed door.

P2705.1.5 Interference with doors and windows. ~~6.~~The location of plumbing piping, plumbing fixtures or plumbing equipment shall not interfere with the operation of doors ~~or~~ and windows.

P2705.1.6 Flood hazard areas. ~~7.~~ In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.7.

~~8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.1.~~

Reason: The items in this section are a mixture of subjects and should be separated into separate sections. Numerous clarifications have been added to make the each section clearer. The term "rigidly" is vague and unenforceable. Item 4 is covered by the requirements in P2705.1.4 and elsewhere in the code. Item number 8 doesn't belong under installation and should be located in Section P2701 (that is why new Section P2701.2 has been added).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 21 on the PMGCAC IRC-P list.

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

P2701.2 (NEW)-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal language is much more confusing than the existing language and doesn't simplify the code.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted by the Floor.

RP31-13

Final Action: AS AM AMPC____ D

RP36-13
P2701.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2701.1 Quality of fixtures. Plumbing fixtures, faucets and fixture fittings ~~shall be constructed of *approved* materials,~~ shall have smooth impervious surfaces~~,~~ shall be free from defects and shall not have concealed fouling surfaces.~~, and shall conform to the standards cited in this code. Plumbing fixtures shall be provided with an adequate supply of potable water to flush and keep the fixtures in a clean and sanitary condition without danger of backflow or cross connection.~~

Reason: The current code text is very old and comes from a time where there were not many standards existed for plumbing fixtures and fittings. According to the first sentence of this section, the code official must approve materials, even those that are in compliance with the standards referenced in the code. The first sentence is revised to make a general statement about the quality of fixtures. The last sentence has nothing to do with quality of fixtures. The subject matter is covered adequately elsewhere in the code so this sentence needs removed.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 18 on the PMGCAC IRC-P list.

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

P2707.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent's reason statement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

P2701.1 Quality of fixtures. Plumbing fixtures, faucets and fixture fittings shall have smooth impervious surfaces, shall be free from defects, ~~and~~ shall not have concealed fouling surfaces and shall conform to the standards cited in this code.

Commenter's Reason: Approved proposals RP36 and RP28 are in conflict with one another because RP36 deletes a section of text that RP28 is modifying. This public comment corrects the problem by making this proposal in agreement with what RP28 accomplishes. The change in RP28 is prudent and we agree with its intent.

RP36-13

Final Action: AS AM AMPC____ D

RP37-13
P2708.3

Proposed Change as Submitted

Proponent: Edward R. Osann, Natural Resources Defense Council, representing self. (eosann@nrdc.org)

Revise as follows:

P2708.3 Shower control valves. Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016 or ASME A112.18.1/CSA B125.1. <u>Shower control valves shall provide thermal shock protection for the rated flow rate of the installed showerhead or a flow rate of 1.5 gpm ± 0.1 gpm (5.75 L/m ± 0.35 L/m), whichever is less</u>. The high limit stop shall be set to limit the water temperature to not greater than 120°F (49°C). <u>Each valve shall be factory marked with the manufacturer's minimum rated flow, and such marking shall be in an accessible position so as to make inspection readily possible following installation.</u> In-line thermostatic valves shall not be used for compliance with this section.

Reason: The thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. As noted by Martin and Johnson (2008) (as cited in Codes and Standards Enhancement Initiative (CASE), "Multi-Head Showers and Lower-Flow Shower Heads," *2013 California Building Energy Efficiency Standards,* California Utilities Statewide Codes and Standards Team, September 2011), combinations of valves and shower heads were tested to determine whether pressure-compensating valves and thermostatic valves rated for 2.5gpm would perform adequately at lower flow rates. The tests included 22 shower valves from six manufacturers, and the valves were assessed on their ability to maintain water temperature within certain bounds for a given time after a change in pressure event, as described by the ASSE 1016-2005 standard for shower valves. The results indicated that a significant share of shower valves rated for 2.5 gpm failed to provide the thermal protection specified by ASSE 1016 when tested at lower flow rates. As summarized in the CASE report (p. 15): "These results indicate that shower valve temperature maintenance is strongly affected by flow rate, and that new showers with lower-flow shower heads would have to be installed with valves that are designed for 2.0 and lower flow rates."

Showerheads with maximum flow rates below 2.5 gpm are widely available on the market today, and simple replacement of a showerhead is typically not subject to code. Since shower valve components are located behind finished walls, replacement of showerheads is likely to be more frequent than replacement of shower valves. This proposed change seeks to reduce the likelihood that consumers replacing a showerhead will compromise the thermal protection offered by a building subject to this code by ensuring that shower valves can fully accommodate showerheads with lower flow rates than the current maximum federal standard of 2.5 gpm. The current EPA WaterSense specification for showerheads has a maximum flow rate of 2.0 gpm, and many showerheads are already available with flow rates between 2.0 and 1.5 gpm. As manufacturers continue to innovate with more water- and energy-efficient showerheads, the code change proposed here will help ensure that new buildings built to this code can safely accommodate showerheads with lower flow rates that may be selected by building occupants in future years.

Note that this language does not require that the showerhead itself have a flow rate of 1.5 gpm, but simply that the shower valve provide the thermal protection called for under the recognized standard when tested at a flow rate as low as 1.5 gpm. In the event that the showerhead selected for initial installation has a flow rate of less than 1.5 gpm, the minimum rated flow if the shower valve must match the flow rate of the showerhead.

The marking requirement is necessary to facilitate inspection. To the extent that the mark is permanent, it will provide a point of reference for building occupants to consider when changing showerheads in future years.

Cost Impact: Conforming products are on the market today without a significant cost premium. The code change proposal will not increase the cost of construction.

P2708.3-RP-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The required marking of this proposal is not going to solve the problem after initial installation when the showerhead is replaced.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council representing himself (eosann@nrdc.org) requests Approval as Modified by this Public Comment

Modify the proposal as follows:

P2708.3 Shower control valves. Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016 or ASME A112.18.1/CSA B125.1. Shower control valves shall provide scald and thermal shock protection for the rated flow rate of the installed showerhead ~~or a flow rate of 1.5 gpm ± 0.1 gpm (5.75 L/m ± 0.35 L/m), whichever is less~~. The high limit stop shall be set to limit the exiting water temperature to not greater than 120°F (49°C). ~~Each valve shall be factory marked with the manufacturer's minimum rated flow, and such marking shall be in an accessible position so as to make inspection readily possible following installation.~~ In-line thermostatic valves shall not be used for compliance with this section.

P2708.3.1 Shower valve marking. Each shower control valve shall be factory marked with the valve's minimum rated flow, and such marking shall be located so as to be readily visible in accordance with one or more of the following conditions:

1. prior to installation of the escutcheon associated with the valve
2. after installation of the escutcheon associated with the valve
3. through an access opening provided for servicing the valve

Commenter's Reason: Current language in the code is inadequate to ensure that the health and safety protection provided by a shower mixing valve is not diminished by mismatching the rated flow of the valve with the flow rate of the showerhead during installation. The committee's disapproval of the proposal focused on the inadequacy of the proposal's marking requirement, while overlooking the need for the code to ensure that these components are properly matched when initially installed. The 2012 Uniform Plumbing Code is more protective of health and safety in this regard. This comment revises the original proposal by including a more workable marking requirement and a more simplified requirement to properly match the valve and showerhead during installation.

This comment proposes changes to the original submittal as follows:

1. Removes the requirement that all shower valves provide thermal protection at flow rates as low as 1.5 gpm, while retaining the requirement that a valve's rated flow for thermal protection be compatible with the design flow rate of the installed showerhead.
2. Eliminates the requirement for the flow rate marking to be visible on the escutcheon and instead only requires the marking to be visible under any one of the following 3 conditions:

   a. prior to installation of the escutcheon associated with the valve,
   b. after installation of the escutcheon associated with the valve, or
   c. through an access opening for servicing the valve.

3. Provides additional clarity to the text.

Two additional points of note:

1. The 2012 Uniform Plumbing Code, Section 408.3, contains similar provisions as to 'matching' valve and showerhead flow rates as follows:

   "Showers and tub-shower combinations shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow of the installed showerhead." The IRC should be no less protective of health and safety than the UPC.

2. The two relevant product standards (ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-11 for shower control valves and ASME A112.18.1-2011/CSA B125.1-11 for showerheads) both provide for marking of flow rates on their respective packaging. Showerheads are required to be marked with their flow rate; however, the 1016 standard does not require shower control valves to be marked with the minimum rated flow. Both standards also *recommend* on their packaging that showerhead and shower control valve be matched as to flow rate.

As noted in the original proposal on shower control valves, the thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. Results of Martin and Johnson (2008), cited in the original proposal, indicate that a significant share of shower valves rated for 2.5 gpm failed to provide the thermal protection specified by ASSE 1016 when tested at lower flow rates. Showerheads with maximum flow rates below 2.5 gpm are widely available on the market today The current U.S. EPA WaterSense specification for showerheads has a maximum flow rate of 2.0 gpm, and over 800 WaterSense showerheads (from 45 manufacturers) are already available with flow rates between 2.0 and 1.5 gpm. Given the findings of the studies, the WaterSense specification, and current manufacturing trends, matching of showerheads to shower control valves is more essential to user health and safety than was the case previously.

Note that this language <u>does not require</u> that the showerhead or the shower control valve be set by code at some predetermined flow rate. Rather, this language simply provides that the valve be rated to provide thermal protection at the flow rate of the showerhead being installed. In the event that a consumer or building owner decides to replace an aging showerhead on an existing shower, this language also assures that the flow rate of the previously installed shower control valve is readily visible either upon removal of the escutcheon covering that valve or through an access opening.

RP37-13

Final Action: AS AM AMPC____ D

RP41-13
P2712.1.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Christopher Salazar, Penguin Toilets LLC., representing Penguin Toilets LLC.

Add new text as follows:

<u>**P2712.1.1 Overflow protection.** Where a water closet is installed in a location where an overflow of the water closet will cause damage to the building, the building shall be protected from water damage by one of the following:</u>

1. <u>A water closet listed to provide overflow protection.</u>
2. <u>A floor drain installed within same area as the water closet.</u>
3. <u>A method of protection *approved* by the building official.</u>

Reason: To be in compliance with IRC section 101 .3: (to provide minimum standards to safeguard life or limb, health, property and public welfare) Toilet overflow (BLACKWATER spill) has not been addressed in the current code. Different from a grey water spill, a black water spill pose an unhealthy environment and is a very expensive event to mediate/repair. Adding this section into the code provides an additional safeguard to health, property and public welfare thus improving this code.

Cost Impact: Code change proposal will not increase the cost of construction. Cost impact is none too little depending on method of protection.

P2712.1.1 (NEW)-RP-SALAZAR.DOC

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The technology of these types of water closets is not proven. This is not something that needs to be forced by the code.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Christopher Salazar, Penguin Toilets representing Penguin Toilets (chris@penguintoilets.com) requests Approval as Submitted.

Commenter's Reason: The committee did not address how to deal with black water. The committee also felt this new code provision would be proprietary.

As submitted by the original proposal this offers a simple way to address black water spills. Note: black water spills are hazardous to human health and safety which costs insurance companies millions of dollars to fix.

This is not proprietary code change because there are multiple ways to address this subject.

RP41-13

Final Action: AS AM AMPC____ D

RP44-13
P2717.2, P2717.3

<u>Proposed Change as Submitted</u>

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2717.2 Sink and dishwasher. <u>The combined discharge from</u> a sink and dishwasher <u>shall be served by</u> ~~are permitted to discharge through~~ a single <u>trap</u> <u>of not less than</u> 1 1/2 inches (38 mm) <u>in nominal diameter</u> ~~trap~~. The discharge pipe from the dishwasher shall be increased <u>in size</u> to not less than 3/4 inch (19 mm) in<u>side</u> diameter ~~and~~ <u>before</u> shall be connect~~ed~~<u>ing</u> ~~with~~ <u>to</u> a wye fitting <u>in</u> ~~to~~ the sink tailpiece. The <u>waste discharge pipe from the</u> dishwasher ~~waste line~~ shall rise and be ~~securely~~ fastened <u>or held in a position</u> ~~to~~ <u>at</u> the underside of the counter before connecting to the wye ~~sink tailpiece~~.

P2717.3 Sink, dishwasher and food <u>waste</u> grinder. The combined discharge from a sink, dishwasher, and <u>food waste</u> grinder <u>shall be served by a single trap of not less than</u> ~~is permitted to discharge through a single~~ 1 1/2 inch (38 mm) <u>in nominal diameter</u> ~~trap~~. The discharge pipe from the dishwasher shall be increased <u>in size</u> to not less than 3/4 inch (19 mm) in<u>side</u> diameter ~~and shall~~ before connect<u>ing</u> ~~with~~ <u>to</u> a wye fitting between the discharge of the food-waste grinder and the trap inlet. <u>Alternatively, the discharge pipe from the dishwasher shall connect</u> ~~or~~ to the head of the food <u>waste</u> grinder. The dishwasher <u>discharge pipe</u> ~~waste line~~ shall rise and be ~~securely~~ fastened <u>or held in a position</u> ~~to~~ <u>at</u> the underside of the counter before connecting to the <u>wye</u> ~~sink tail piece~~ or the <u>head of the</u> food <u>waste</u> grinder.

Reason: The term "is permitted" is not mandatory code language. The proper term for a food grinder is a food waste grinder. The term "securely" is unenforceable. The term "or held in a position" was added primarily because the existing language seems to imply that the discharge pipe *has to be fastened* to the underside of the counter. This is a problem with granite countertops. The intent is that the piping be routed to the underside of the countertop and be held in some manner at that point. A common way to accomplish this is to drill a hole in the cabinet wall between the dishwasher and the sink cabinet, at the top of the cabinet wall (if the cabinet wall goes up to the underside of the countertop. Sometimes, the cabinet wall is not as tall and there a small gap. Then route the dishwasher discharge pipe through the hole or over the top of the cabinet wall. No fastening is needed (as it is very difficult to get into the cabinet and reach up between the sink and the cabinet wall to install a "fastener"). Intelligent routing is all that is necessary. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 27 on the PMGCAC IRC-P list.

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

P2717.2-RP-HALL-PMGCAC

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproved**

Committee Reason: The ¾ inch inside diameter will not match up to the sink tailpiece fitting connection.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

Revise as follows:

P2717.2 Sink and dishwasher. ~~A sink and dishwasher are permitted to discharge through a single 1 1/2 inches (38 mm) trap. The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall be connected with a wye fitting to the sink tailpiece. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the wye sink tailpiece.~~ The combined discharge from a dishwasher and a one- or two– compartment sink, with or without a food waste disposer, shall be served by a trap of not less than 1 1/2 inches (38 mm) in outside diameter. The dishwasher discharge pipe or tubing shall rise to the underside of the counter and be fastened or otherwise held in that position before connecting to the head of the food waste disposer or to a wye fitting in the sink tailpiece.

~~**P2717.3 Sink, dishwasher and food grinder.** The combined discharge from a sink, dishwasher, and grinder is permitted to discharge through a single 1 1/2 inch (38 mm) trap . The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall before connect with a wye fitting between the discharge of the food-waste grinder and the trap inlet. or to the head of the food grinder. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the sink tail piece or the food grinder.~~

Commenter's Reason: The committee reason for disapproval caused us to dig deeper into what the standards indicate for tubular sink tailpieces with dishwasher connection branches. The code referenced standards are ASME A112.18.2/CSA B125.2 (covering metal and plastic waste fittings) and ASTM F409 (covering only plastic fittings). The ASME/CSA standard does not indicate dimensions for the dishwasher connect branch. The ASTM standard indicates an outside diameter of either 5/8 inch or 7/8 inch. A survey of several manufacturers' product lines of both metallic and plastic tubular sink tailpieces with dishwasher connection branches reveals a number of available configurations, some of which do not comply with ¾ inch diameter (*note that even the ASTM F409 standard doesn't comply with the 3/4 inch diameter!*). Our conclusion is that the size of the dishwasher connection branch should not be indicated in these code sections. The standards for these fittings are already covered by Table P2701.1 (for Plumbing fixture waste fittings). The manufacturers of these fittings are obviously coordinating design of their products to meet the requirements for a variety of dishwasher discharge pipe, hose and tubing connections. The installer simply has to provide the correct fitting for the application or use an adapter/connector to make the connection. The wye's tube size is not critical and does not need to be specified – industry takes care of this. This revised proposal eliminates a size indication conflict in the code that has existed for many editions.

Upon further examination of the original proposal, we determined that the two sections could be easily combined as they are virtually identical. In this public comment, the wording has been greatly simplified. We changed the size of the trap to outside diameter to encompass tubular size traps. Also note that a clarification was added to indicate that the "sink" could have one- or two-compartments. There was some concern expressed within the PMGCAC that "sink" might only mean a single compartment sink when in fact, two compartment sinks, with or without a food waste disposer, and with a dishwasher have been installed in this manner for decades.

Some may object to being so specific about limiting the number of compartments that can be handled by the single trap arrangement. With the trend of higher end residential kitchens using "quasi-commercial" plumbing fixtures in the kitchen, we have concerns that a 1-1/2 inch tubular trap might not be able to pass enough flow if 3 (or more) compartment sinks are discharging at the same time that the dishwasher is discharging (let alone if a disposer is forcing waste into the system). Because we only know that a 2 compartment arrangement work, based on extensive field use, we didn't want to relax the limit to accommodate all multi-compartment sinks. We leave that discussion for future code change proposals.

RP44-13

Final Action: AS AM AMPC____ D

RP45-13
P2718.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

P2718.2 Water connection. The water supply to an automatic clothes washer shall be protected against backflow by an air gap complying with ASME A112.1.3 or A112.1.2 that is installed integrally within the machine or a backflow preventer in accordance with Section P2902.

Reason: The requirement for automatic clothes washing machines to comply with ASSE 1007 (covering the requirement for an internal air gap on the water supply) was removed from the 2012 code because ACW manufacturers are no longer certifying their machines to ASSE 1007. Standards that they do comply with, ASME A112.1.3 or A112.1.2 are being included in this section so that inspectors are able to verify that the ACWs have an integral backflow protection. A similar proposal to the IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 28 on the PMGCAC IRC-P list.

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

P2718.2 (NEW)-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: These standards needed because ASSE discontinued the ASSE 1007 standard.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Pennie L. Feehan, Pennie L. Feehan Consulting representing Copper Development Association (penniefeehan@me.com) requests Disapproval.

Commenter's Reason This proposal is unenforceable by a field inspector. In most cases the washer and dryers are not on site at the final inspection. Would the contractor need to provide a clothes washer at final inspection?

RP45-13
Final Action: AS AM AMPC____ D

RP46-13
P2722.2

Proposed Change as Submitted

Proponent: Len Swatkowski, Plumbing Manufacturers International (PMI), representing Plumbing Manufacturers International (lswatkowski@pmihome.org)

Revise as follows:

P2722.2 Operation for hot water. Faucets and bath tub mixing valves having two separate control handles for hot and cold water shall be installed with the left-hand handle controlling the hot water flow. Left-hand orientation shall be determined from the position of the user when using the plumbing fixture or in the case of a bathtub, the position of the user when in the tub. ~~Fixture fittings supplied with both hot and cold water shall be installed and adjusted so that the left-hand side of the water temperature control represents the flow of hot water when facing the outlet.~~ Shower and tub/shower mixing valves conforming to ASSE 1016 or ASME A112.18.1/CSA B125.1 shall have markings on the device that indicate the handle position for hot water flow.

> ~~**Exception:** Shower and tub/shower mixing valves conforming to ASSE 1016 or ASME A112.18.1/CSA B125.1, where the water temperature control corresponds to the markings on the device.~~

Reason: There have been calls from a number of code officials about how to apply this code section to these “side control” faucets. Technically, because the control does not have a left side and does not cause hot water to flow when moving a lever to the left, some code officials are calling this a non-compliant faucet. This language will correct the misinterpretation.

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

Analysis: The proponent indicated in his proposal submission that the standards shown in this code section, ASSE 1016 and ASME A112.18.1/CSA B125.1 have been recently harmonized into standard ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-11. The proponent’s request for updating the standard for this section has been processed and will be included in a proposal for all standard updates that will be heard by the ADMIN committee in proposal ADM 62-13.

P2722.2-RP-SWATKOWSKI.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This language is easier to understand and it clarifies how tub only faucets need to be installed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Disapproval.

Commenter’s Reason: The proposed new language seems to further confuse the issue. Why are we now calling the control a handle? The control is not always a handle. The existing language was clear and does not need to be changed.

RP46-13
Final Action: AS AM AMPC____ D

RP47-13
P2725 (New), P2725.1 (New)

Proposed Change as Submitted

Proponent: Jeremy Brown, NSF International (brown@nsf.org)

Add new text as follows:

SECTION P2725
NON-LIQUID SATURATED TREATMENT SYSTEMS

P2725.1 General. Materials, design, construction and performance of non-liquid saturated treatment systems shall comply with NSF 41.

Add new standard to Chapter 44:

NSF
NSF 41-11 Non-Liquid Saturated Treatment Systems

Reason: NSF/ANSI-41 *Non-liquid Saturated Treatment Systems* is the American National Standard for the materials, design, construction and performance of composting toilets treating residential black water. Composting Toilets are a viable alternative are a viable alternative to traditional water closets and offer advantages of low water consumption. NSF/ANSI 41 is currently required in the IGCC.

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

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

P2725(NEW)-RP-BROWN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Composting toilets should only be in the IgCC, not in the IRC.

Assembly Action: **Approved as Submitted**

Individual Consideration Agenda

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Submitted by the Floor.

RP47-13
Final Action: AS AM AMPC____ D

RP49-13
P2801.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

<u>**P2801.2 Drain valves**. Drain valves for emptying shall be installed at the bottom of each tank-type water heater and hot water storage tank. The drain valve inlet shall be a ¾ inch nominal iron pipe size and the outlet shall be provided with a male garden hose thread.</u>

(Renumber subsequent sections)

Reason: The new language proposed provides for minimum requirements for water heater drain valves. Drain valves are necessary for draining water (and sediment) out of the tank. Yes, we know that it would be rare for a storage water heater or hot water storage tank to not be provided with a drain valve BUT if the code doesn't require it, the manufacturers (or installers) could save costs by eliminating the valve (they could claim that the tank could be drained by pumping from the inlet or outlet of the tank.) The IPC has had the valve requirement for a long time. The IRC needs to have the same coverage. A similar proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 29 on the PMGCAC IRC-P list.

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

P2801.2 (NEW)-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This requirement needs to be stated in the code to back up what water heater manufacturers already provide for tank type water heaters.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2801.2 Drain valves. Drain valves for emptying shall be installed at the bottom of each tank-type water heater and hot water storage tank. The drain valve inlet shall be <u>not less than</u> ¾ inch nominal iron pipe size and the outlet shall be provided with a male ~~garden~~ hose thread.

Commenter's Reason: Additional wording is needed to allow the drain valve to be not less than ¾" so that a larger drain valve could be provided if needed or supplied with the water heater. With the current wording an inspection agency may disapprove a drain valve that is larger than ¾". The term garden is jargon and is struck as the term hose thread is clear enough.

RP49-13

Final Action: AS AM AMPC____ D

RP51-13
P2801.5

Proposed Change as Submitted

Proponent: Jim Whitehead, IPS Corporation.

Revise as follows:

P2801.5 Required pan. Where a storage tank-type water heater or hot water storage tank is installed in a location where water leakage from the tank will cause damage, the tank shall be installed in a pan constructed of one of the following:

1. galvanized steel ~~pan having a material thickness~~ of ~~not less than 0.0236 inch (0.6010 mm)~~ ~~(~~No. 24~~)~~ gage or a lesser gage number,
2. aluminum not less than 0.030 inch (0.8 mm) in thickness,
3. plastic not less than 0.036 inch (0.9 mm) in thickness
4. ~~other pans~~ *approved* materials ~~for such use~~.

~~Listed pans shall comply with CSA LC3.~~ A plastic pan shall not be installed beneath a gas-fired water water.

Reason: Aluminum and plastic water heater pans are frequently and commonly installed all across the United States even though the code doesn't currently include these materials as an option. I know this is a fact because IPS and other manufacturers produce and sell *tens of thousands* of aluminum and plastic water heater pans every year. In most areas, building officials really don't care what material the pan is made of, just as long as there is a pan. So why not make the code match what is current practice for many areas? Let's face it-a galvanized steel pan is ugly. It eventually gets rusty looking. The top edges, if not hemmed, are sharp (a cutting hazard) and the square corners are hard to seal. The top of the square corners can puncture things (like human flesh and the bottoms of jugs). THEN you want to require that galvanized steel pan to be installed in a finished area like a indoor utility room or a laundry room in a home? The home owner just doesn't want it.

Yes, the existing section currently says "or other pans approved for such use". But does the building official really need to be spending the time approving "other pans" for use on a job-by-job basis? In reality, when the building official shows up to inspect, the pan is in place (beneath a water heater that is plumbed and filled with water). Is that the time for the building official to be making a decision about whether the pan material is *approved*? This proposal will eliminate the questions and free up building official time in order to deal with more important issues.

So if aluminum pans and plastic pans are being *approved* (and again we know that they must be as *tens of thousands* of these pans are sold every year), then there needs to be some criteria for these types of pans. The thicknesses indicated for aluminum and plastic materials have been determined to be at least equivalent to the galvanized steel with regard to deflection (of the sides of the pan) and puncture resistance. NOT ALL MANUFACTURERS OF ALUMINUM AND PLASTIC PANS HAVE CONSIDERED THIS IN THEIR SELECTION OF MATERIAL THICKNESSES. And we are positive that some building officials have developed a bad opinion about allowing the use of aluminum and plastic because of their experiences with competitor's products that use lighter weight materials than what is proposed. There are at least a few of us responsible manufacturers who produce quality aluminum and plastic pans that meet the proposed requirements. Based upon our field surveys of our pans in use, these thicknesses provide for a durable product that remains serviceable, corrosion free and good looking for the life of a typical water heater if not two water heater lives.

"Listed pans shall comply with CSA LC3" is being deleted because there is not any pan produced in the United States that complies with that standard. When this standard was introduced into to the code, there was a product, available to the market, that met this standard. The standard was actually developed around this pan/stand design. Furthermore this standard was developed using the stand/pan in combination. Most pans are placed directly on the floor and not elevated on a stand. Also. the product was discontinued because of design problems. (The product was a combination elevation stand and pan assembly). CSA withdrew the standard in November 2011. There is not a need to have this standard in the code any longer and we don't want someone trying to bring a product to the market that meets this standard. Obviously, the standard isn't up to snuff because the products made to the standard didn't work out. The standard needs to be deleted from the code.

The last line about prohibiting the use of a plastic pan under a gas fired water heater is simple common sense. Although we have not heard of any problems with the use of our plastic pans for gas water heaters, the radiant heat coming from the bottom of a gas fired water heater could make a plastic pan more susceptible to puncturing (such as might be caused by the legs of a water heater). The Uniform Plumbing Code has this prohibition so the same prohibition in the I-codes seems appropriate.

Cost Impact: The code change proposal will not increase the cost of construction. In fact, factory-made aluminum and plastic water heater pans are, by far, much more economical than a galvanized steel pan that is made in a local sheet metal shop.

P2801.5-RP-WHITEHEAD

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

P2801.5 Required pan. Where a storage tank-type water heater or hot water storage tank is installed in a location where water leakage from the tank will cause damage, the tank shall be installed in a pan constructed of one of the following:

1. galvanized steel or aluminum of not less than 0.0236 inch (0.6010 mm) ~~24 gage or a lesser gage number,~~
~~2. aluminum not less than 0.030 inch (0.8 mm) in thickness,~~
~~3.~~ 2. plastic not less than 0.036 inch (0.9 mm) in thickness
~~4.~~ 3. other *approved* materials.

A plastic pan shall not be installed beneath a gas-fired water ~~water~~ heater.

Committee Reason: The modification allows for more options for drain pans. The overall reason for approving the proposal is agreement with the proponent's reason statement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jim Whitehead, IPS Corporation representing IPS Corporation (Jim.whitehead@ipscorp.com) requests Approval as Submitted.

Commenter's Reason: Based on sound technical reasoning, we request that our original proposal be Approved as Submitted instead of the Committee approved modification (that was suggested from a proposed floor modification). The members should realize that a pan of 0.0236" aluminum is more likely to being damaged if stepped on, or punctured/torn by the legs of a water heater (as found on some gas fired models). Such damage could result in a pan leak which could cause failure of the floor beneath the water heater, possibly causing the water heater to fall over. Other industries recognize that aluminum has a lower tensile strength than steel and therefore, when converting from a steel design to an aluminum design, thicker material is necessary in order to maintain the integrity of the product. Specifying an aluminum material to be the *same* thickness as a steel material is not technically logical. As a manufacturer of water heater pans for over 30 years, IPS recognizes the importance of providing a product that will withstand the rigors of installation and long term service. The 0.030" thick material for aluminum pans has proven to be the minimum acceptable thickness for durability. Many companies such as ours have standardized on this thickness. We have witnessed many problems with aluminum pans made of 0.0236" thick (and thinner) material made by some of our competitors. We know that reducing the aluminum material thickness to be more competitive with manufacturers of those thinner material pans is **not** a viable solution. If it was, we and other manufacturers like us would have already reduced the thickness to match theirs. Again, based upon our 30 years of experience of our pans and our (thinner material) competitor's pans, allowing 0.0236 inch aluminum material would be significantly lowering the bar for safety.

RP51-13
Final Action: AS AM AMPC____ D

RP52-13
P2801.5.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2801.5.1 Pan size and drain. The pan shall be not less than $1\frac{1}{2}$ inches (38 mm) deep and shall be not less than 3 inches (76 mm) greater in diameter than the diameter of the water heater or hot water storage tank. ~~be of~~ ~~sufficient size and shape to receive all dripping or condensate from the tank or water heater.~~ The pan shall be drained by a~~n indirect waste~~ drain pipe connected to the pan. The drain pipe shall be ~~of~~ not less than $\frac{3}{4}$ inch (19 mm) nominal diameter~~.~~ ~~Piping for safety pan drains~~ and shall be of any of the ~~those~~ materials ~~listed~~ indicated in Table P2905.5. Pipe fittings for the drain pipe shall be in accordance with Section P2905.6 except that insert-type fittings shall not be installed in the drain piping.

Reason: This section needs to include the horizontal dimension of the pan with respect to the water heater. Some installations have been observed where the pan exactly fits the bottom of the water heater. This does not allow any space for water in the pan to flow to the pan drain on the side of the pan. The drain is now specifically required to be on the side of the pan so that it is less likely to become blocked. The improved wording also prevents a water heater from being located in the pan where the water heater blocks the drain outlet on the side of the pan. The 3 inches over sizing was based on the same pan requirement in the mechanical code for HVAC units. The struck language in the first sentence is archaic and vague. The existing language also failed to identify what fittings should be used for drain piping. The new language corrects this omission. While the existing language specifies the type of pipe to be used, it doesn't specify the fittings. The last sentence is added to clarify the fittings that must be used. Note the restriction against using insert fittings…the ¾ inches minimum size is already small enough without putting insert fittings in the piping to further reduce the diameter. Such reductions in internal diameter could catch lint and rust particles that could easily block flow.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 32 on the PMGCAC IRC-P list.

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

P2801.5.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: There is not any evidence that bigger pans are needed as not many catastrophic water heater failures actually occur.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

P2801.5.1 Pan size and drain. The pan shall be not less than 11/2 inches (38 mm) deep. <u>The pan horizontal dimension</u> ~~and~~ shall be not less than ~~3 inches (76 mm) greater in diameter than~~ the diameter of the water heater or hot water storage tank. <u>Where the flat bottom of a tank will rest directly on the bottom of the pan, the pan dimension shall be not less than 1 inch (25.4 mm) larger than the tank diameter.</u> <u>The drain outlet in the pan shall not be blocked by a tank in the pan or any materials in the pan used to raise a tank above the bottom of a pan.</u>

The pan shall be drained by drain pipe connected to the pan. The drain pipe shall be not less than 3/4 inch (19 mm) nominal diameter and shall be of any of the materials indicated in Table P2905.5. Pipe fittings for the drain pipe shall be in accordance with Section P2905.6 except that insert-type fittings shall not be installed in the drain piping.

Commenter's Reason: Our original intent for specifying a pan size was to eliminate the ambiguous phrase "sufficient size and shape". Another intent was to prevent a situation where the supplied (especially a round) pan was of the same diameter as the bottom of diameter of a flat bottomed tank (typically a standard electric water heater or hot water storage tank) resulting in a side drain outlet of the pan being blocked so there was not a flow path for the escaping water to travel to the drain outlet.

Since we made the original proposal, additional concerns came to us about the trend of future water heaters and hot water storage tanks having thicker insulation (thanks to the federal energy laws). In the situation of replacing an existing water heater, any requirement for a pan to be larger in size than the outside of the tank could present installation problems. For example, the water heater in a narrow closet. Therefore, this public comment changes the proposed language for pan size to only require the pan to be as large as the outside of the (insulated) tank. It also adds a requirement that the water heater not be "offset" in the pan such that the drain outlet not be blocked. In other words, don't position the water heater in the pan up against the drain pan outlet. Or, if the drain is on the bottom of the pan, don't place a flat bottom tank right on top of the drain (the installer can raise the tank by placing the tank on suitable "risers"). While it should be *common sense* to make sure that the drain outlet isn't blocked, putting it in the code provides the basis for the code official to reject careless installations that could result in installed pans not doing what they were intended to do (to catch and drain the leaking water)

The added exception language "except where the flat bottom of a tank will rest directly on the pan," requires some (minimal) "flow path" around the tank in that situation. However, if for some reason the pan cannot be 1 inch larger that the tank (this obviously being a *really* tight fit installation), then the installer could always raise the flat bottom tank slightly (or more) above the pan bottom by placing the tank on pieces of "suitable" material (such as metallic plates, concrete cap blocks or bricks) so that the escaping water can flow *under* the tank to the drain outlet.

RP52-13

Final Action: AS AM AMPC____ D

RP54-13
P2803.1, P2803.2 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2803.1 Relief valves required. <u>Storage water heaters and hot water storage tanks</u> ~~Appliances and equipment used for heating water or storing hot water~~ shall be protected <u>against over-pressure</u> <u>and over-temperature conditions</u> by <u>one of the following methods</u>:

1. A separate pressure-relief valve and a separate temperature-relief valve ~~; or~~
2. A combination pressure- and temperature-relief valve.

<u>**P2803.2 Instantaneous fuel-gas fired water heater relief valve.** A fuel-gas fired instantaneous water heater shall be protected against over-pressure conditions by a pressure relief valve. The valve shall be located on the cold water inlet piping to the heater at a point that is downstream of all external valves except where the heater manufacturer's instructions require the valve be located elsewhere.</u>

(Renumber subsequent sections)

Reason: In Section P2803.1, the terms "appliances and equipment" is not specific to the coverage that is intended by the code. Chapter 28 is about water heaters. Example: an electric hot drinking-waterunit (under a kitchen sink) is an appliance that heats and stores water. The section never says what the heaters or tanks are being protected against. Adding "over-pressure" and "over temperature" clarifies this.

A question that is often asked is whether existing Section P2803.1 applied to instantaneous ("tankless") water heaters as it is impossible to install a temperature relief valve (in accordance with Section P2803.4) as there is no tank! A new section is added to cover gas instantaneous ("tankless") water heaters. The fuel gas-fired instantaneous water heater industry is waffling about whether a pressure relief valve is required and most have in their instructions " it's up the local code official or jurisdiction". Many questions come up about this and code officials are not sure what to do. We need to settle the debate by simply requiring the pressure relief valve at least for the gas-fired tankless water heaters. Note that electric instantaneous water heaters are exempt from having a PRV by the UL listing for those products. While the code *could* be written to require PRVs for electric tankless water heaters, it is impractical to install PRVs for the small electric units (think of the one fixture, under the cabinet type) and then the issue is where to route the discharge pipe. Generally, the gas instantaneous ("tankless") water heaters are for the whole building and are installed in a basement, garage or other location (outside) where routing of the PRV pipe is no more difficult than it is for a storage tank water heater.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 34 on the PMGCAC IRC-P list.

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

P2803.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal doesn't address small tankless water heaters. The manufacturer's instructions take precedence.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: The committee wanted "small tankless" units to be addressed. We can only assume that the committee's comment meant electric instantaneous (tankless) units as small as point-of-use type units.

The committee's comment that "the manufacturer's instructions take precedence" deserves a reiteration of what was in our reason statement in the original proposal:

> "The fuel gas-fired instantaneous water heater industry is waffling about whether a pressure relief valve is required and most have in their instructions "it's up the local code official or jurisdiction". Many questions come up about this and code officials are not sure what to do. We need to settle the debate by simply requiring the pressure relief valve, at least, for the gas-fired tankless water heaters."

With respect to electric tankless water heaters, the requirements for pressure relief valves by the manufacturers (and the standard for listing for these products, UL499) is even more muddy than it is for gas-fired instantaneous tankless water heaters. Electric instantaneous (tankless) water heater manufacturers are stating the following in their instruction manuals:

> "This unit is not required by UL to have a Pressure and Temperature safety relief valve (PTRV). You should check with local codes to find out if one is required in your area."
>
> "Tankless water heaters such as the <model name> are not required to be equipped with a Pressure and Temperature Relief Valve (except in Massachusetts)."
>
> "Tankless water heaters such as the <model name> are not required to be equipped with a pressure and temperature relief valve (p&t). If the local inspector will not pass the installation without a p&t, it should be installed on the hot water outlet side of the unit."

Recent discussions with listing and labeling agencies about electric tankless water heaters revealed that *some* designs of electric tankless water heaters are required to have "pressure relief devices". Some of these devices are integral to the product design, are not mentioned in the unit's instructions and provide no way to connect a discharge pipe to route the discharge to a safe location. Some electric tankless water heaters *do* require a traditional pressure relief valve but the listing requires that the valve be factory-installed prior to shipment.

And keep in mind the *practicality* of requiring pressure relief valves for ALL electric instantaneous (tankless) units. Consider a unit serving one lavatory in a powder room that is in the middle of the home. Where will the discharge pipe from the relief valve be routed to? Trying to determine which electric tankless water heaters needs to have a pressure relief valves is too difficult to unravel. The original proposal only addressed gas-fired tankless water heaters for good reason – this subject related to electric tankless water heaters is too complex to address at this time.

We believe it is prudent to approve the original proposal simply because a gas-fired appliance that has to potential to rapidly heat water constitutes a safety hazard. Designers and installers need consistent guidance everywhere that the code is adopted so that the decision as to whether a pressure relief valve is needed is not made on a jurisdiction to jurisdiction basis.

RP54-13

Final Action: AS AM AMPC____ D

RP57-13
P2901.1, P2901.2 (New), P2901.2.1 (New), P2901.2.2 (New), P2901.2.3 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2901.1 Potable water required. Potable water shall be supplied to plumbing fixtures and plumbing appliances ~~in *dwelling units* shall be supplied with potable water in the amounts and pressures specified in this chapter~~ except where treated rainwater, treated gray water or municipal reclaimed water is supplied to water closets, urinals and trap primers. ~~Where a nonpotable water-distribution systems is installed, the nonpotable system shall be identified by color marking, metal tags or other appropriate method. Where color is used for marking, purple shall be used to identify municipally reclaimed water, rainwater and graywater distribution systems. Nonpotable water outlets that could inadvertently be used for drinking or domestic purposes shall be posted.~~

P2901.2 Identification of nonpotable water systems. Where *nonpotable* water systems are installed, the piping conveying the nonpotable water shall be identified either by color marking, metal tags or tape in accordance with Sections P2901.2.1 through P2901.2.2.3.

P2901.2.1 Signage Required. All nonpotable water outlets such as hose connections, open ended pipes, and faucets shall be identified with signage that reads as follows: "Non-potable water is utilized for [application name]. Caution: non-potable water. DO NOT DRINK."The words shall be legibly and indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material or shall be indelibly printed on the fixture. The letters of the words shall be not less than 0.5 inches in height and in colors in contrast to the background on which they are applied. In addition to the required wordage, the pictograph shown in Figure P2901.2.1 shall appear on the signage required by this section.

FIGURE P2901.2.1
Pictograph – DO NOT DRINK

P2901.2.2 Distribution Pipe Labeling and Marking. Non-potable distribution piping shall be of the color purple and shall be embossed or integrally stamped or marked with the words: "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or shall be installed with a purple identification tape or wrap. Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow. Hazardous piping systems shall also contain information addressing the nature of the hazard. Pipe identification shall be repeated at intervals not exceeding 25 feet (7620 mm) and at each point where the piping passes through a wall, floor or roof. Lettering shall be readily observable within the room or space where the piping is located.

P2901.2.2 .1 Color. The color of the pipe identification shall be discernable and consistent throughout the building. The color purple shall be used to identify reclaimed, rain and gray water distribution systems.

P2901.2.2 .2 Lettering Size. The size of the background color field and lettering shall comply with Table P2901.2.2.2.

TABLE P2901.2.2.2
SIZE OF PIPE IDENTIFICATION

PIPE DIAMETER (inches)	LENGTH BACKGROUND COLOR FIELD (inches)	SIZE OF LETTERS (inches)
¾ to 1 ¼	8	0.5
1 ½ to 2	8	0.75
2 ½ to 6	12	1.25
8 to 10	2	2.5
over 10	32	3.5

For SI: 1 inch = 25.4 mm.

P2901.2.2 .3 Identification Tape. Where used, identification tape shall be at least 3 inches wide and have white or black lettering on purple field stating "CAUTION: NON-POTABLE WATER – DO NOT DRINK". Identification tape shall be installed on top of non-potable rainwater distribution pipes, fastened at least every 10 feet to each pipe length and run continuously the entire length of the pipe.

Reason: The phrase "in *dwelling units* shall be supplied with water in the amounts and pressures specified in this chapter" is not necessary because the code already spells out the requirements in other sections.

Water distribution systems of other than potable water are being installed in buildings and the code needs to require marking of the piping and signage for the outlets for safety reasons. The basis for this new language is text from the IgCC and is written to be in alignment with the IgCC requirements. A similar proposal to the 2015 IPC was Approved as Modified by Public Comment.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 36 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will increase the cost of construction

P2901.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is necessary for the safety of the public when nonpotable water is being used in the building.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2901.2.1 Signage Required. All nonpotable water outlets such as hose connections, open ended pipes, and faucets shall be identified with signage that reads as follows: "Non-potable water is utilized for [application name]. Caution: non-potable water. DO NOT DRINK."The words shall be legibly and indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material or shall be indelibly printed on the fixture. The letters of the words shall be not less than 0.5 inches in height and in colors in contrast to the background on which they are applied. In addition to the required wordage, the pictograph shown in Figure P2901.2.1 shall appear on the signage required by this section.<u> The requirements of this section shall not be construed to require signage for water closets and urinals utilizing nonpotable water for flushing.</u>

Commenter's Reason: The proposed additional language is to make it clear that no signage is required for water closets or urinals that are being supplied with a non potable water source. The existing language could be interpreted that signage is required for water closets and urinals using a non potable water source however we feel that this was not the intent of this language and want to make it clear that such signage is not required specifically for these two fixtures.

RP57-13

Final Action: AS AM AMPC____ D

RP64-13
P2902.3.3

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.3 Backflow preventer with intermediate atmospheric vent. Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012 or CSA B64.3. These devices shall be <u>designed for the outlet to be</u> ~~permitted to be installed where~~ subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

Reason: The term "shall be permitted" is not mandatory code language. The section was reworded to eliminate the term.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 40 on the PMGCAC IRC-P list.

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

P2902.3.3-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Diapproved**

Committee Reason: The term "design" shouldn't be in the section. The standard for the product covers the design.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

Revise as follows:

P2902.3.3 Backflow preventer with intermediate atmospheric vent. Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012 or CSA B64.3. ~~These devices shall be permitted to be installed where subject to continuous pressure conditions.~~ The relief opening shall discharge by air gap and shall be prevented from being submerged.

Commenter's Reason: We are simply trying to remove the "shall be permitted" from the section. But after review of the sentence having "shall be permitted" in it, we see no value of the sentence in the code. The sentence is really not clear in its intent. The installer must follow the installation instructions for the product so it is unnecessary for this sentence to remain in the code.

RP64-13
Final Action: AS AM AMPC____ D

RP66-13
P2902.3.4

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.4 Pressure vacuum breaker assemblies. Pressure vacuum breaker assemblies shall conform to ASSE 1020 or CSA B64.1.2. Spill-resistant vacuum breaker assemblies shall comply with ASSE 1056. These assemblies ~~are~~ shall be designed for the outlet to be subject to ~~installation under~~ continuous pressure conditions. ~~where the critical level is installed at the required height.~~ Pressure vacuum breaker assemblies shall not be installed in locations where ~~spillage~~ leakage of water from the assembly could cause damage to the structure.

Reason: The third sentence is in non-mandatory language and the critical height has nothing to do with the assembly's capability to accept pressure on the outlet of the assembly. The term "spillage" is vague (spillage of what?) and doesn't truly say what the intent is.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 41 on the PMGCAC IRC-P list.

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

P2902.3.4-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee preferred RP67.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

Revise as follows:

P2902.3.4 Pressure vacuum breaker assemblies. Pressure vacuum breaker assemblies shall conform to ASSE 1020 or CSA B64.1.2. Spill-resistant vacuum breaker assemblies shall comply with ASSE 1056. ~~These assemblies are designed for installation under continuous pressure conditions.~~ Pressure vacuum breaker assemblies shall not be installed in locations where ~~spillage~~ leakage of water from the assembly could cause damage to the structure.

Commenter's Reason: We are simply trying to remove the "shall be permitted" from the section and clarify the meaning of "spillage". But after review of the sentence having "shall be permitted" in it, we see no value of the sentence in the code. In fact, the sentence could lead someone to believe that the device is suitable for protection under a backpressure condition. Table P2902.3 indicates that these devices offer protection against only backsiphonage conditions. The installer must follow the installation instructions for the product so it is unnecessary for this sentence to remain in the code. The term "spillage" is slang so the last sentence is modified to really say what is intended so that these devices are not inadvertently installed in an area where leakage of water would create an issue.

RP66-13

Final Action: AS AM AMPC____ D

RP68-13
P2902.3.5

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.5 Reduced pressure principle backflow prevention assemblies. Reduced pressure principle backflow prevention assemblies and reduced pressure principle fire protection backflow prevention assemblies shall conform to ASSE 1013, AWWA C511, CSA B64.4 or CSA B64.4.1. Reduced pressure detector fire protection backflow prevention assemblies shall conform to ASSE 1047. These ~~devices~~ assemblies shall be designed for the outlet to be ~~permitted to be installed where~~ subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

Reason: The term "shall be permitted" is not mandatory code language. The language was revised to make the intent clear.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 42 on the PMGCAC IRC-P list.

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

P2902.3.5-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The term "design" shouldn't be in the section. The standard for the product covers the design.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

Revise as follows:

P2902.3.5 Reduced pressure principle backflow prevention assemblies. Reduced pressure principle backflow prevention assemblies and reduced pressure principle fire protection backflow prevention assemblies shall conform to ASSE 1013, AWWA C511, CSA B64.4 or CSA B64.4.1. Reduced pressure detector fire protection backflow prevention assemblies shall conform to ASSE 1047. ~~These devices shall be permitted to be installed where subject to continuous pressure conditions.~~ The relief opening shall discharge by air gap and shall be prevented from being submerged.

Commenter's Reason: We are simply trying to remove the "shall be permitted" from the section. But after review of the sentence having "shall be permitted" in it, we see no value of the sentence in the code. The sentence is not really clear in its intent. The installer must follow the installation instructions for the product so it is unnecessary for this sentence to remain in the code.

RP68-13

Final Action: AS AM AMPC____ D

RP69-13
P2902.3.6

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.6 Double check-valve assemblies. Double check-valve assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double detector check-valve assemblies shall conform to ASSE 1048. These ~~devices~~ assemblies shall be designed for the outlet to be subject to ~~capable of operating under~~ continuous pressure conditions.

Reason: The last sentence doesn't really say what is intended. The revision corrects the problem.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 43 on the PMGCAC IRC-P list.

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

P2902.3.6-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The term "design" shouldn't be in the section. The standard for the product covers the design.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

Revise as follows:

P2902.3.6 Double check-valve assemblies. Double check-valve assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double detector check-valve assemblies shall conform to ASSE 1048. ~~These devices shall be capable of operating under continuous pressure conditions.~~

Commenter's Reason: We are simply trying to remove the "shall be permitted" from the section. But after review of the sentence having "shall be permitted" in it, we see no value of the sentence in the code. The sentence is not really clear in its intent. The installer must follow the installation instructions for the product so it is unnecessary for this sentence to remain in the code.

RP69-13

Final Action: AS AM AMPC____ D

RP75-13
P2902.5.1

Proposed Change as Submitted

Proponent: Michael S. Moss, representing American Backflow Prevention Association (msmoss@utah.gov)

Revise as follows:

P2902.5.1 Connections to boilers. ~~The potable supply to the boiler shall be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA B64.3. Where conditioning chemicals are introduced into the system,~~ The potable water connection to a boiler shall be protected by an *air gap* or a reduced pressure principle backflow prevent~~er~~ion assembly complying with ASSE 1013, CSA B64.4 or AWWA C511.

Reason: These assemblies are designed and sold for high-health hazard installations according to manufacturer specification sheets. They are adequate for chemical additions or injections. Reduced pressure principle backflow *preventer* corrected to reduced pressure principle backflow *prevention assembly* to provide consistent terminology throughout the code for reference and comparison.

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

. **P2902.5.1-RP-MOSS**

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

P2902.5.1 Connections to boilers. The potable supply to the boiler shall be permitted to be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA B64.3. Where conditioning chemicals are introduced into the system, the potable water connection to a boiler shall be protected by an *air gap* or a reduced pressure principle backflow prevention assembly complying with ASSE 1013, CSA B64.4 or AWWA C511.

Committee Reason: The modification puts backflow preventers covered by ASSE 1012 back into the code for this application. The overall proposal provides consistency that is needed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Michael S. Moss of the American Backflow Prevention Association (msmoss@utah.gov) requests Approval as Modified by this Public Comment

Further modify proposal as follows:

P2902.5.1 Connections to boilers. Where chemicals will not be introduced into a boiler, the potable water supply to the boiler shall be ~~permitted~~ ~~to be equipped with~~ protected from the boiler by a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA B64.3. Where ~~conditioning~~ chemicals ~~are~~ will be introduced into ~~the~~ a boiler ~~system~~, the potable water supply ~~connection~~ to ~~a~~ the boiler shall be protected from the boiler by an *air gap* or a reduced pressure principle backflow prevention assembly complying with ASSE 1013, CSA B64.4 or AWWA C511.

Commenter's Reason: In reviewing the language of the floor proposal submitted during the Committee Action Hearings, I recognize the need to reword this proposal to make it clearly mandatory language. Also my intent is to ensure that the proposal provides adequate and appropriate protection based upon addition of chemicals into the boiler system. I recommend that this proposal be accepted and approved as modified.

RP75-13

Final Action: AS AM AMPC____ D

RP78-13
P2902.5.6 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

<u>**P2902.5.6 Yard hydrants.** The potable water supply to a frost proof yard hydrant having a stop-and-waste valve located underground or below grade shall be protected against backflow by a reduced pressure principle backflow prevention assembly.</u>

Reason: There is no way to know what type of health hazard the stop and waste opening of a yard hydrant will be exposed to. The contaminants could include lawn fertilizer, animal wastes, garden fertilizer or septic tank effluent. The code currently lacks coverage for what type of backflow protection is necessary for this application which has some code officials choosing simple a dual check valve which is only suitable for low hazard. This is an accident waiting to happen.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 53 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

P2902.5.6 (NEW)-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This proposal is much too restrictive as it requires a specific backflow device for a supplying a yard hydrant.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

P2902.5.6 Yard hydrants. The potable water supply to a ~~frostproof~~ <u>freezeproof</u> yard hydrant having a stop-and- waste valve located underground or below grade shall be protected against backflow by <u>a backflow preventer with intermediate atmospheric vent, a pressure vacuum breaker assembly, a spill-resistant vacuum breaker assembly or</u> a reduced pressure principle backflow prevention assembly.

Commenter's Reason: As the committee indicated, they wanted more options for backflow protection. This public comment provides options. We have changed “frostproof” to “freezproof” to be in alignment with existing Section P2903.9.5 terminology.

RP78-13
Final Action: AS AM AMPC____ D

RP81-13
Table P2903.2

Proposed Change as Submitted

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself (eosann@nrdc.org)

Revise as follows:

TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION
FOR PLUMBING FIXTURES AND FIXTURE FITTINGS[b]

PLUMBING FIXTURE OR FIXTURE FITTING	~~PLUMBING FIXTURE OR FIXTURE FITTING~~ MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	~~2.2~~ 1.5 gpm at 60 psi
Shower head[a]	~~2.5~~ 2.0 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	~~1.6~~ 1.3 gallons per flushing cycle[c]

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m,1 pound per square inch = 6.895 kPa.
a. A hand-held shower spray is also a shower head.
b. Consumption tolerances shall be determined from referenced standards.
c. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.

Reason: The maximum flow rates and water consumption levels in the current Table P2903.2 for water closets, shower heads, and lavatory faucets equate to nationwide standards enacted nearly 20 years ago. In December, 2010, the US Department of Energy determined that states were no longer preempted from adopting more stringent efficiency standards for these products. (*Federal Register*, Vol. 75, No. 245, December 22, 2010, p. 80289; this document is attached).

Today, fixtures and fittings that perform well at flush volumes and flow rates lower than the values in Table P2903.2 are widely available. Since 2006, the establishment of the WaterSense voluntary labeling program for water efficient products and services by the Environmental Protection Agency has provided a framework for the recognition of products that are substantially more efficient than minimum federal requirements while maintaining full functionality and customer satisfaction. WaterSense criteria were established for tank-type toilets (1.28 gpf) in 2007; lavatory faucets (1.5 gpm @ 60 psi) in 2007; and showerheads (2.0 gpm @ 80 psi) in 2010. Manufacturers have responded by bringing large numbers of models to market that meet or exceed WaterSense specifications. Based on the most recent reports by WaterSense partners, the following figures regarding the number of WaterSense labeled models available as of December 2012 indicate the widespread availability and commercial viability of plumbing products that are more efficient than the federal minimum standards shown in the current Table P2903.2:

- Tank-type water closets 1,475 models from 87 brands
- Lavatory faucets and accessories 5,207 models from 134 brands
- Showerheads 808 models from 45 brands

With the pace of introduction of new models that meet WaterSense specifications, it is reasonable to expect that these figures will be substantially larger by 2015.

Improving the water efficiency of water closets, shower heads, and lavatory faucets in new residential construction will save future building owners money and reduce the likelihood of municipal water and wastewater capacity constraints that can lead to moratoria on new connections.

NRDC estimates that nationwide adoption of the values in this proposal in all newly constructed single-family homes, effective 2016, can be expected to yield substantial additional savings of resources and dollars, as follows:

- 110 million gallons of water per day in 2030;
- 3,200 1,644 Gigawatt-hours of electricity per year in 2030;
- 118 million therms of natural gas per year in 2030; and
- Cumulative savings for consumers of $632 million through 2030.

Cost Impact: While the costs of plumbing fixtures and fittings vary greatly due to style, trim, colors, and materials, the incremental cost of greater efficiency alone for products meeting the flush volumes and flow rates contained in this proposal is negligible. This code change proposal will not increase the cost of construction.

P2903.2T-RP-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Modify the proposal as follows:

Committee Reason: Older drainage systems might not be able to handle the lower flows allowed by this proposed table. This belongs in the IgCC.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org); Julius Ballanco, JB Engineering and Code Consulting, P.C (JBENGINEER@aol.com); John Koeller, Koeller and Company (koeller@earthlink.net); and Harry Misuriello, American Council for an Energy-Efficient Economy (misuriello@verizon.net) request Approval as Modified by this Public Comment

Modify the proposal as follows:

TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION
FOR PLUMBING FIXTURES AND FIXTURE FITTINGS[b]

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	1.5 gpm at 60 psi
Shower head[a]	2.0 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	1.3 gallons per flushing cycle[c,d]

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. A hand-held shower spray is also a shower head.

b. Consumption tolerances shall be determined from referenced standards.

c. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.

d. The maximum flow shall be1.6 gallons per flushing cycle for water closets connected to the sanitary drainage system of an existing building.

Commenter's Reason: The committee's stated reason for disapproval, "Older drainage systems might not be able to handle the lower flows allowed by this proposed table," is addressed by adding an exception to the new standard for water closet installations in existing buildings that might be subject to code. As the committee implies, drainage from new water closets operating at 1.3 gpf in newly-constructed one- and two family homes is not an issue. These products have achieved widespread acceptance in the US market. In 2011, over half of all tank-type toilets sold in the US were certified to meet the EPA WaterSense specification of 1.28 gpf, according to the EPA. In order to achieve the WaterSense label, a product must "Perform as well or better than their less efficient counterparts." A number of ratings reports, including those published by *Consumer Reports* and the City of Austin, Texas (as well as unpublished reports from the cities of Eugene, Oregon and Los Angeles, California) consistently identify toilets and showerheads that operate at the flows identified in this proposal as receiving good to excellent ratings.

It is also important to note that the Plumbing Manufacturers Institute (PMI) identified the very same flow rates and water consumption levels as proposed here in its own "PMI PRODUCT WATER EFFICIENCY POSITIONS: Residential Products &

Applications," published in August 2012 (available at: http://www.pmihome.org/files/PMI_Water_Efficiency_Sustainability_Statement.pdf).

The proposed changes -- lavatory faucets at 1.5 gpm and showerheads at 2.0 gpm) are identical to PMI's position statement; the proposed change to 1.3 gpf for water closets is the rounded equivalent to PMI's suggested 1.28 gpf. PMI identified 2014 as the appropriate timing for a 1.28 gpf requirement for water closets; January, 2010 as appropriate timing for lavatory faucets at 1.28 gpm; and August, 2012 for showerheads at 2.0 gpm. As the changes proposed here would be implemented in the 2015 IRC base code, with likely field applicability in 2016 at the earliest, this proposal fully accommodates the timetable identified by PMI as acceptable to the plumbing industry.

RP81-13

Final Action: AS AM AMPC____ D

RP83-13
P2903.4, P2903.4.1, P2903.4.2

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.4 Thermal expansion control. ~~A means for controlling increased pressure caused by thermal expansion shall be installed where required in accordance with Sections P2903.4.1 and P2903.4.2.~~ <u>Where a storage water heater is supplied with cold water that passes through a check valve, pressure reducing valve or backflow preventer, a thermal expansion tank shall be connected to the water heater cold water supply pipe at a point that is downstream of all check valves, pressure reducing valves and backflow preventers. Thermal expansion tanks shall be sized in accordance with the tank manufacturer's instructions and shall be sized such that the pressure in the water distribution system shall not exceed that required by Section P2903.3.1.</u>

~~**P2903.4.1 Pressure-reducing valve.** For water service system sizes up to and including 2 inches (51 mm), a device for controlling pressure shall be installed where, because of thermal expansion, the pressure on the downstream side of a pressure-reducing valve exceeds the pressure reducing valve setting.~~

~~**P2903.4.2 Backflow prevention device or check valve.** Where a backflow prevention device, check valve or other device is installed on a water supply system using storage water heating equipment such that thermal expansion causes an increase in pressure, a device for controlling pressure shall be installed.~~

Reason: Any location there is a pressure reducing device, a check valve or a backflow preventer in the cold water piping to a storage-type water heater, a means to compensate for thermal expansion must be installed. This is typically accomplished with an expansion tank. Other methods for relieving thermal expansion pressure, such additional relief valves, waste water for the life of the system. Thermal expansion tanks are required by most storage water heater manufacturers to protect the water heater. Expansion tank manufacturers typically size their tanks so that the water distribution system pressure will remain just shy of the pressure required to open a 150 psi water heater relief valve. This will allow the system pressure to exceed the maximum pressure intended by Section P2903.3.1, which is unacceptable. A similar proposal for the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 47 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

P2903.4-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This would prevent the use of other devices to prevent thermal expansion pressure increase that have been used successfully in the past.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: This proposed language is already cast for the 2015 IPC. Do you really want to have the IRC have different requirements for controlling thermal expansion than the IPC? This will lead to confusion so we urge approval of this proposal.

RP83-13
Final Action: AS AM AMPC____ D

RP84-13
P2903.7

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.7 Size of water-service mains, branch mains and risers. The size of the water service pipe shall be not less than 3/4 inch (19 mm) diameter. The size of water service mains, branch mains and risers shall be determined according to water supply demand [gpm (L/m)], available water pressure [psi (kPa)] and friction loss caused by the water meter and *developed length* of pipe [feet (m)], including *equivalent length* of fittings. The sizes of piping in ~~of~~ ~~each~~ a water distribution system shall be determined ~~according to~~ by design methods conforming to ~~acceptable~~ accepted engineering practice. ~~, such as those methods in Appendix~~ ~~P~~ ~~and shall~~ Such methods shall be *approved.* ~~by the code *official*~~.

Reason: The code should never direct or refer the reader to an appendix. What is “acceptable” ? What is intended is “accepted”. See definition for *accepted engineering practice* in the IPC. The material in the appendix is not normally adopted and in many cases, does not exist in the adopted code of a jurisdiction. The reference needs to be deleted. “Approved by the building official” is redundant. *Approved* already means approval by the building official.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 48 on the PMGCAC IRC-P list.

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

P2903.7-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: An appendix should not be referred to by the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Beahm, County of Warren, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Disapproval.

Commenter’s Reason: The Code already clearly defines that acceptable engineering design practices may be used to meet this requirement, but it also allows the code official direct guidance that Appendix P is considered an acceptable method of compliance without having to have other documents. This Code change does nothing more than remove a reference to Appendix P that some code officials rely on for the justification for it to be used.

RP84-13
Final Action: AS AM AMPC____ D

RP88-13
P2903.9.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.1 ~~Service~~ Main water valves. Each *dwelling unit* shall be provided with an accessible, full-open main water ~~shutoff~~ valve ~~near~~ within 18 inches (457 mm) ~~the entrance~~ of where the water service pipe enters the structure at a foundation wall or where the water service extends above the floor of a concrete slab-on-grade. ~~The valve shall be of a full-open type having nominal restriction to flow, with provision for drainage such as a bleed orifice or installation of a separate drain valve. Additionally,~~ Where the supply of water for the structure is from a public water main, a valve shall be provided between the end of the utility-owned water supply pipe and the beginning of the water service pipe. ~~shall be valved at the curb or lot line in accordance with local requirements.~~

Reason: The terms "near" and "nominal restriction" are vague and unenforceable. The term "bleed orifice" and "valved" are slang terminology. The word "additionally" is unnecessary.

The industry seems to understand what constitutes a "full open" valve. The dimension of 18 inches for the location of the valve is offered to the Development Committee as a starting point for specifying the proximity of the valve to the entrance into the structure. The Committee can easily change this dimension if it chooses. The point in specifying a distance is to provide better guidance and more leeway than simply stating "at" the entrance.

A "bleed orifice" on a main water shut off valve is used so rarely that if it did get used many years after installation, the orifice is frequently useless because it is clogged and corroded. It is wishful thinking to believe that a modern water distribution system can be completely drained through a "bleed orifice" (or a drain valve) at the main water valve. Many jurisdictions have not enforced this feature for many years. The IPC contains no such requirement.

The last line is revised to remove slang terminology ("valved").

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 49 on the PMGCAC IRC-P list.

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

P2903.9.1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproval**

Committee Reason: This proposal appears to add an additional, unnecessary valve to the system and the dimension for locating the valve is too restrictive.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Replace proposal as follows:

Revise as follows:

P2903.9.1 ~~Service~~ Main water valve. Each *dwelling unit* shall be provided with an accessible, full-open main water shutoff valve. ~~near the entrance of the water service~~. For water supplied by a water utility, the location of the valve shall be at any point between the utility point-of-delivery and the first branch connection of the water distribution system for the *dwelling unit*. The required valve shall not be utility-owned. For individual water supply systems, the valve shall be located at any point between the source of water pressure such as a pressure tank, and the first branch connection of the water distribution system for the *dwelling unit*. ~~The valve shall be of a full-open type having nominal restriction to flow, with provision for drainage such as a bleed orifice or installation of a separate drain valve. Additionally, the water service shall be valved at the curb or lot line in accordance with local requirements.~~

Commenter's Reason: In our original proposal, the public hearing committee tried to modify the proposed "too restrictive" 18 inch dimension to 5 feet but that modification was not successful. After discussion among the members of the PMGCAC and with a few interested parties, we believe that attempting to put *any* dimension in this section is futile – there are just too many arrangements to consider. One dimension just can't fit all circumstances. Therefore, we propose new language for location of the valve to provide for the widest latitude for all possible circumstances and geographic regions.

The fourth sentence was added because for individual water supply systems (such as a well system) we believe there needs to be clarification that the required valve needs to be between the source of pressure and the first branch of the water distribution system. Putting a valve in the water service pipe from the well to the pressure tank isn't what is intended because the pressure tank can deliver a fair amount of water after the pump is isolated from the tank. The intent of having a main water valve is to be able to shut off the water pressure quickly for emergencies and service work.

The first part of the second to the last sentence of the existing text was struck out because "full open" is an understood term to most plumbers. In the past, a full-open valve meant a full-port gate valve. In recent years, full-port ball valves are more commonly used for full-open valve applications.

The second part of the second to the last sentence of the existing text was struck out because, as stated in the original proposal, requiring a "bleed orifice" on a main water shut off valve (or a separate drain valve) is useless in the majority of situations. The main water valve might not be in a location (such as in a wall) where the bleed orifice cannot be easily directed into a bucket. If a bleed orifice was used many, many years after installation of the valve, the orifice is frequently useless because it is clogged and corroded. Use of the bleed orifice usually results in having to replace the valve. And, where the valve is located underground, having a bleed orifice (or a separate drain valve) below grade would violate the intent of Section P2903.9.5 (Potable water openings below grade are prohibited). It is wishful thinking to believe that a modern water distribution system can be completely drained through a "bleed orifice" (or a drain valve) at the main water valve. Many jurisdictions don't appear to be enforcing the "bleed orifice" or "separate drain valve" requirement. The topic of winterizing water supply systems in buildings is far more extensive than a simple requirement for a drain point. Note that the IPC contains no requirement for a water system drain point.

The last sentence was struck out because the water utility is going to supply a valve at the utility point-of-delivery as part of a water meter or as a curb stop accessed through a "buffalo box" or "B-box", as some call it. There is no need for the code to discuss this valve because the utility supplies that valve. In some jurisdictions, it is illegal for anyone, other than the utility, to operate their valve (especially if that valve is upstream of a meter). The code should not allow a utility-owned valve to serve as the code-required valve. We added the third sentence to make this clear.

RP88-13

Final Action: AS AM AMPC____ D

RP89-13
P2903.9.2

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.2 Water heater valve. A *readily accessible* full open valve shall be installed in the cold-water supply pipe to each water heater. ~~at or near~~ Such valve shall be within 18 inches (457 mm) of the water heater.

Reason: The term "near" is vague and unenforceable. The term "at" is too restrictive. The dimension of 18 inches for the location of the valve is offered to the Development Committee as a starting point for specifying the proximity of the valve to the water heater. The Committee can easily change this dimension if it chooses. The point in specifying a distance is to provide better guidance and more leeway than simply stating "at" or "near" the entrance.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 50 on the PMGCAC IRC-P list.

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

P2903.9.2-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The dimension for locating the valve is too restrictive.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: Most of the time, an installer is going to put the valve right at the water heater, as we believe, is the right location. The dimension of 18 inches is not overly restrictive. Yes, there could be situations where the installer might want to put a valve in some other location for easy access by the homeowner. For example, an installer putting a water heater in an attic might want to put a valve that can be accessed from the floor below so that the homeowner can easily turn off water to the water heater. Such valves would be in addition to the required "at" the water heater. Having the valve "at" the water heater allows service personnel to perform maintenance and repairs quickly and easily without having to go up and down stairs or travel some distance away from the water heater to turn the water off and on. Note that the 18 inch dimension is NOT indicated as a developed pipe length. The required valve could be located anywhere within 18 inches of the water heater. For example, the 18 inch requirement would not preclude locating the valve alongside of and at some distance from the top of a storage tank water heater that was on an elevation stand in a garage so that the valve would be within easy reach for the homeowner.

RP89-13

Final Action: AS AM AMPC____ D

RP93-13
P2903.9.5

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.5 Outlets and stop-and-waste valves prohibited below grade. Potable water outlets and ~~combination~~ stop-and-waste valves shall not be installed underground or below grade. Freezeproof yard hydrants that drain the riser into the ground ~~are~~ shall be considered to be stop-and-waste valves.

> **Exception:** Installation of freezeproof yard hydrants that drain the riser into the ground shall be permitted provided that ~~if~~ the potable water supply to such hydrants is protected upstream of the hydrants in accordance with Section P2902.5.6 and the hydrants are permanently identified as nonpotable outlets by *approved* signage ~~that reads as~~ having the followings~~s~~ words: “CAUTION, NONPOTABLE WATER. DO NOT DRINK.

Reason: The term “combination” is not needed and confuses the intent of the section. The plumbing industry knows what a stop and waste valve is. Use of the phrase “shall be permitted” in the exception is frequently not acceptable but in this situation, it does work because specific conditions are required for such hydrant use. The term “if” needs to be changed to “provided that” in order to format the remainder of the statement as the conditions of installation. The last line is revised to because signs don’t “read”, they only have words printed on them.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 54 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

P2903.9.5-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproval**

Committee Reason: The exception is referring to Section P2902.5.6 which doesn’t exist in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

P2903.9.5 Outlets and stop-and-waste valves prohibited below grade. Potable water outlets and stop-and-waste valves shall not be installed underground or below grade. Freezeproof yard hydrants that drain the riser into the ground shall be considered to be stop-and-waste valves.

Exception: Installation of freezeproof yard hydrants that drain the riser into the ground shall be permitted provided that the potable water supply to such hydrants is protected upstream of the hydrants in accordance with Section P2902~~.5.6~~ and the hydrants are permanently identified as nonpotable outlets by *approved* signage having the following~~s~~ words: "CAUTION, NONPOTABLE WATER. DO NOT DRINK".

Commenter's Reason: The committee was right in that there isn't a Section P2902.5.6. This public comment corrects the error.

RP93-13

Final Action: AS AM AMPC____ D

RP94-13
P2903.10

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~**P2903.10 Hose bibb shut off valve.** Hose bibbs subject to freezing, including the "frost-proof" type, shall be equipped with an accessible stop-and-waste-type valve inside the building so that they can be controlled and drained during cold periods.~~

> ~~**Exception:** Frostproof hose bibbs installed such that the stem extends through the building insulation into an open heated or semiconditioned space need not be separately valved (see Figure P2903.10).~~

P2903.10 Outdoor hose connection faucets. Hose-connection faucets such as hose bibbs, sillcocks and lawn faucets that are located on the building and exposed to the outdoors shall have a stop-and-waste valve installed on the fixture supply pipe to the faucet. The stop-and-waste valve shall be accessible and shall be located in an area of the building where the valve is not subject to freezing.

> **Exceptions:**
>
> 1. The stop-and-waste valve shall not be required where the winter design temperature indicated in Table R301.2.(1) is greater than 32°F (0° C).
> 2. The stop-and-waste valve shall not be required where the valve seat of the hose connection faucet is located in an area of the building that is not subject to freezing temperatures (see Figure P2903.10).

Reason: The hose bibb is not "equipped" with a stop-and-waste valve; the water supply pipe to the hose bibb is to have the stop and waste valve. Are hose bibbs really "controlled"? "Valved" is slang terminology. What is a "semiconditioned" space? The revised text eliminates improper language and makes the intent clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 55 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

P2903.10-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproval**

Committee Reason: The proposed language is not clear. The existing language is clearer.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

P2903.10 Outdoor hose connection faucets. Hose-connection faucets such as hose bibbs, sillcocks and lawn faucets that are located on the exterior of the building and subject to freezing ~~exposed to the outdoors~~ shall have a stop-and-waste valve installed on the fixture supply pipe to the faucet. The stop-and-waste valve shall be accessible and shall be located in an area of the building where the valve is not subject to freezing.

Exception~~s~~:

~~1. The stop-and-waste valve shall not be required where the winter design temperature indicated in Table R301.2.(1) is greater than 32°F (0° C).~~

~~2.~~ The stop-and-waste valve shall not be required where the valve seat of the hose-connection faucet is located in an area of the building that is not subject to freezing temperatures (see Figure P2903.10).

Commenter's Reason: We believe that the original proposal language is clearer than the existing language. We think that the real reason for committee disapproval was that they did not like having the specific conditions called out for where freezing conditions could exist. We have reworked the proposal to continue to allow for ambiguity as to where (geographically) freezing conditions will occur.

RP94-13

Final Action: AS AM AMPC____ D

RP97-13
P2904 (New), P2904.1 (New), Table P2904.1 (New)

Proposed Change as Submitted

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself. (eosann@nrdc.org)

Add new text as follows:

SECTION P2904
HOT WATER DISTRIBUTION SYSTEMS

P2904.1 Hot water pipe volume. The volume in the piping between the end of a *hot water fixture supply* and the piping connection to a *hot water* source shall not exceed 0.5 gallon (1.9 liters). The hot water source shall be a recirculating system pipe, a heat-traced pipe or a water heater. The volume in the piping shall be calculated using the values in Table P2904.1.

TABLE P2904.1
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING								
Nominal Size (Inches)	**Copper Type M**	**Copper Type L**	**Copper Type K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**PEX-AL-PEX ASTM F 1281**	**PE-AL-PE**	**PEX CTS SDR 9**
⅜	1.06	0.97	0.84	N/A	1.17	0.63	0.63	0.64
½	1.69	1.55	1.45	1.25	1.89	1.31	1.31	1.18
⅝	2.49	2.31	2.22	N/A	N/A	2.12	2.12	1.72
¾	3.43	3.22	2.90	2.67	3.38	3.39	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	5.56	5.56	3.91
1¼	8.70	8.36	8.09	6.61	9.66	8.49	8.49	5.81
1½	12.18	11.83	11.45	9.22	13.20	13.88	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	21.48	21.48	13.86

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons,
0.5 gallon (1.9 liters) = 64.0 liquid ounces

Reason: Cold or tepid water in the initial draw from a hot water outlet is often unusable for its intended purpose, and is frequently purged, resulting in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the user sooner. However, a complementary strategy is to reduce the volume of water contained in the hot water distribution system in the first place.

This proposal, which is comparable to the criteria adopted by the US EPA WaterSense for New Homes specification in 2009, establishes a maximum volume of 0.5 gallons for water in a hot water supply line, based on internal volumes specific to the piping material. By allowing the volume limitation to be computed from runs from recirculation loops, this provision allows designers additional flexibility in larger homes while effectively limiting the amount of cooled down water to be purged to ½ gallon per draw.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

P2904 (NEW) #1-RP-OSANN.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: This is a water reducing proposal that would be better suited for the IgCC. Also, same comment as for RP95. The added cost of construction could not be afforded by some customers.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org) requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION P2904
HOT WATER DISTRIBUTION SYSTEMS

P2904.1 Hot water pipe volume. ~~The volume in the piping between the end of a *hot water fixture supply* and the piping connection to a *hot water* source shall not exceed 0.5 gallon (1.9 liters).~~ The volume of water in a service hot water system between the termination of a supply pipe to individual fixtures indicated in Section P2904.1.1 and the nearest source of hot water shall not exceed 128 ounces (3.8 liters). The hot water source shall be a recirculating system pipe~~, a heat-traced pipe~~ or a water heater. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds located between the hot water source and the fixture supply pipe termination. The volume in the piping shall be calculated using the values in Table P2904.1. The calculation of the internal volume of plumbing appurtenances and piping materials or dimensions not included in Table P2904.1 shall be documented and *approved.*

P2904.1.1 Scope. The volume limitation in Section P2904.1 shall apply to hot water supplied to all of the following fixtures:

1. lavatories
2. kitchen sinks
3. showers
4. combination tub-showers

TABLE P2904.1
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

	LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING									
Nominal Size (Inches)	**Copper Type M**	**Copper Type L**	**Copper Type K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**CPVC SCH 80**	**~~PEX-AL-PEX~~ Composite ASTM F 1281**	**~~PE-AL-PE~~**	**PE-RT SDR 9**	**PEX CTS SDR 9**
⅜	1.06	0.97	0.84	N/A	1.17	N/A	0.63	~~0.63~~	0.64	0.64
½	1.69	1.55	1.45	1.25	1.89	1.46	1.31	~~1.31~~	1.18	1.18
⅝	~~2.49~~	~~2.31~~	~~2.22~~	~~N/A~~	~~N/A~~		~~2.12~~	~~2.12~~		~~1.72~~
¾	3.43	3.22	2.90	2.67	3.38	2.74	3.39	~~3.39~~	2.35	2.35
1	5.81	5.49	5.17	4.43	5.53	4.57	5.56	~~5.56~~	3.91	3.91
1¼	8.70	8.36	8.09	6.61	9.66	8.24	8.49	~~8.49~~	5.81	5.81
1½	12.18	11.83	11.45	9.22	13.20	11.38	13.88	~~13.88~~	8.09	8.09
2	21.08	20.58	20.04	15.79	21.88	19.11	21.48	~~21.48~~	13.86	13.86

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons, ~~0.5~~ 1 gallon (~~1.9~~ 3.8 liters) = ~~64.0~~ 128 liquid ounces

Commenter's Reason: In response to the committee's concern that the original proposal was too stringent for a minimum code, and after further discussion with builders, this public comment modifies the proposal in several important ways, most notably by increasing the maximum volume permitted within a hot water supply pipe to any individual fixture to 1 gallon (128 ounces), up from ½ gallon in the original proposal. Additionally, this comment simplifies and clarifies the original proposal in the following ways:

- Limits the applicability of the proposal to hot water piping serving three types of fixtures:
  - Showers and tub-shower combinations.

- Kitchen sinks.
- Lavatories.

- Conforms the table of internal volumes for various types and diameters of piping material to the values in Table E202.1 of the International Plumbing Code as approved for 2015.
- Clarifies that the permissible volume of water is to be calculated from the "nearest" source of hot water to an "individual" fixture.
- Removes reference to heat traced pipe as a source of hot water, an application more likely to be found in multifamily residential or commercial construction, and thus not germane here.
- Adds a sentence to clarify the inclusion of the internal volume of valves, manifolds, and similar devices that may be located on hot water piping between the nearest heat source and the termination of the supply pipe at a fixture.
- Adds a sentence to allow calculation of the internal volume of plumbing appurtenances such as manifolds and pipe materials or dimensions that are not included in the table, with documentation satisfactory to the code official.

The initial purging of cooled-down hot water that is insufficiently hot for its intended purpose results in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the user sooner. However, a complementary strategy is to reduce the volume of water contained in hot water piping in the first place.

A 2009 paper authored by Robert Hendron of the National Renewable Energy Laboratory[1] and others quantified the waste of hot water in initial draws waiting for water to reach 105ºF. Modeling the plumbing typical of a 3-bedroom, 2-bath, single-story home with a hot water distribution simulation tool found that an estimated 12 % of all hot water used on an annual basis is wasted. When viewed by fixture, the results are even more instructive:

- Showers – over 10 % wastage.
- Kitchen sinks – 18 % wastage.
- Lavatories – over 30 % wastage.

Purging at these fixtures is responsible for 95 % of the estimated total of nearly 3,000 gallons of hot water wastage annually. Of course, many new homes are built with more hot water outlets than this model's base case, and hot water distribution systems that are far less efficient. Nevertheless, this revision to RP97 will direct the attention of designers, installers, and code officials to the piping of fixtures that are responsible for most hot water waste.

The table in the proposal is simply a computational aid, to provide a handy, standardized reference for determining the volume of water per linear foot of pipe. The internal diameters of various types of piping material are different enough that including specific values for each type of pipe material is useful, helping designers find the desired combination of pipe length and permissible volume. Modifications to the table in this comment are simply to conform the Table to the values and materials already accepted for Table E202.1 in the IPC. Code officials we consulted viewed the table as helpful for inspection purposes as well.

The committee assumed, in its stated reason for disapproval, that this proposal would add construction costs. On the contrary, the hot water volume limit in the proposal can be achieved with attention to water heater placement and piping layout at the design stage, and need not require additional costs. The downsizing of pipe diameters and the substitution of piping materials with smaller internal diameters are additional strategies available to designers and installers. Reducing pipe length, reducing pipe diameter, and substituting composite piping material with smaller internal diameter each have the effect of reducing installation costs. And the designation of a recirculation system pipe as a heat source for purposes of calculating permissible hot water volume offers additional design flexibility for homes employing a recirculation system, an option often preferable to an additional water heater in a large home.

The IRC, as a minimum code, has a crucial role to play in curbing excessive waste of water and energy during the design and construction of new homes. An inefficient hot water distribution system is likely to remain in place for the life of the building, leaving owners without access to options that would have only been practical at the time of construction.

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[1] Hendron, Robert, et al, "Potential for Energy Savings through Residential Hot Water Distribution System Improvements", Proceedings of the 3rd International Conference on Energy Sustainability, San Francisco, CA, July 2009.

RP97-13

Final Action: AS AM AMPC____ D

RP98-13
P2904 (New), P2904.1 (New)

<u>Proposed Change as Submitted</u>

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself. (eosann@nrdc.org)

Add new text as follows:

<u>P2904</u>
<u>HOT WATER DISTRIBUTION SYSTEMS</u>

<u>**2904.1 Hot or tempered water supply to fixtures.** The developed length of hot water piping and tempered water piping from the end of a hot or tempered water *fixture supply* to the piping connection to a hot or tempered water source shall not exceed 50 feet (15 240 mm). The hot or tempered water source shall be a recirculating system pipe, a heat-traced pipe or a water heater.</u>

Reason: This proposal sets a maximum length of 50 feet for hot (or tempered) water supply piping running from a heat source to any fixture. The language the first sentence is identical to Section 607.2 of the International Plumbing Code, which typically applies to much larger buildings than one- and two-family homes. Excessively long hot water piping results in excessive amounts of cooled water that must be purged before use, especially for showers and wash basins. For example, 70 feet of ¾ inch pipe contains nearly 2 gallons of water. At an average shower flow rate of 2.2 gallons per minute, a shower served by such a long pipe run would be running for over 50 seconds just to purge cold water from the hot water supply line, plus the additional time needed to warm the pipe between the heat source and the shower – all water, energy, and time wasted. A 50 foot limit will encourage money-saving choices about the placement of water heaters and hot water outlets in the design of large homes. This provision makes sense in the IPC and will make sense in the IRC as well.

The last line of the section simply ensures that when either recirculating systems or heat-traced piping are present, they are to be considered sources of hot or tempered water.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

P2904 (NEW) #2-RP-OSANN.DOC

<u>Committee Action Hearing Results</u>

Committee Action: **Disapproval**

Committee Reason: This proposal could require multiple water heaters and recirculation piping which would unnecessarily add to the cost of construction of a home.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org) Julius Ballanco, JB Engineering and Code Consulting, P.C (JBENGINEER@aol.com); Harry Misuriello, American Council for an Energy-Efficient Economy (misuriello@verizon.net) requests Approval as Submitted.

Commenter's Reason: The committee's stated reason for disapproval, that this proposal ***could*** [emphasis added] require multiple water heaters and recirculation piping, is speculation. The proposal sets a maximum length of 50 feet for hot (or tempered) water supply piping running from a hot water source to any fixture. This limit can be readily achieved with attention to water heater placement and piping layout at the design stage, and **does not require** multiple water heaters or recirculation piping. The designation of a recirculation system pipe as a hot water source for purposes of calculating the 50-foot length limit is to provide design flexibility, not to require the installation of a recirculation system. Indeed, the language in the first sentence – "The developed length of hot water piping and tempered water piping from the end of a hot or tempered water *fixture supply* to the piping connection to a hot or tempered water source shall not exceed 50 feet (15 240 mm)" is identical to Section 607.2 of the International Plumbing Code (IPC), which typically applies to much larger buildings than one- and two-family homes. There is no evidence that this requirement in the IPC has led to any increase in development costs. Indeed, commercial buildings routinely use 50 feet or less for hot (or tempered) water supply piping from a hot water source. If this limitation can work in commercial buildings, it can certainly work in a residential setting. This provision makes sense in the IPC and will make sense in the IRC as well.

Excessively long hot water piping results in excessive amounts of cooled water that must be purged before use, especially for showers and wash basins. For example, 70 feet of ¾ inch pipe contains nearly 2 gallons of water. If connected to a tub-shower combination with an average shower flow rate of 2.2 gallons per minute, a shower served by such a long pipe run would be running for over 50 seconds just to purge cold water from the hot water supply line, plus the additional time needed to warm the pipe between the heat source and the shower – all water, energy, and time wasted. A 50 foot limit will encourage money-saving choices about the placement of water heaters and hot water outlets in the design of large homes.

RP98-13

Final Action: AS AM AMPC____ D

RP105-13
Table P2905.4, P3004.3, Table P3302.1

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

TABLE P2905.4
WATER SERVICE PIPE

MATERIAL	STANDARD
~~Asbestos-cement pipe~~	~~ASTM C296~~

(Portions of table not shown are unchanged)

~~**P3003.4 Asbestos-cement.** Joints between asbestos-cement pipe or fittings shall be made with a sleeve coupling of the same composition as the pipe, sealed with an elastomeric ring conforming to ASTM D 1869.~~

TABLE P3302.1
SUBSOIL DRAIN PIPE

MATERIAL	STANDARD
~~Asbestos-cement pipe~~	~~ASTM C508~~

(Portions of table not shown are unchanged)

Reason: Asbestos cement pipe is no longer manufactured in North America. The potential health issues associated with asbestos make this piping material unsuitable for use. The material needs to be removed from the code. A similar proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 58 on the PMGCAC IRC-P list.

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

P2905.4T #1-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approve as Submitted**

Committee Reason: The material is no longer made in this country so there is no need to have it in the code.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Further modify proposal as follows:

TABLE P3002.1(2)
UNDERGROUND BUILDING DRAINAGE AND VENT PIPE

PIPE	STANDARD
~~Asbestos-cement pipe~~	~~ASTM C 428~~

TABLE P3002.2
BUILDING SEWER PIPE

MATERIAL	STANDARD
~~Asbestos-cement pipe~~	~~ASTM C 428~~

TABLE P3002.3
PIPE FITTINGS

PIPE MATERIAL	FITTING STANDARD
~~Asbestos cement~~	~~ASTM C 428~~

Commenter's Reason: We forgot to include the removal of asbestos-cement pipe from several tables in Chapter 30, Sanitary Drainage. This public comment corrects the oversight.

RP105-13
Final Action: AS AM AMPC____ D

RP114-13
P2905.14, Chapter 44

Proposed Change as Submitted

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P2905.14 Soldered and brazed joints. Soldered joints in copper and copper alloy tubing shall be made with fittings approved for water piping and shall conform to ASTM B 828. Surfaces to be soldered shall be cleaned bright. Fluxes for soldering shall be in accordance with ASTM B813 and shall become noncorrosive and non-toxic after soldering. Brazing fluxes shall be in accordance with AWS A5.31. ~~The joints shall be properly fluxed and made with approved solder.~~ Solders and fluxes used in potable water-supply systems shall have a lead content of not greater than 0.2 percent. ~~Fluxes shall conform to ASTM B 813.~~

Add standard to Chapter 44 as follows:

AWS
A5.31-2012 Specification for Fluxes for Brazing and Braze Welding

Reason: This proposal relocated existing sections, ensures copper and copper alloy systems are installed correctly and removes redundant language to aid the end user.

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

Analysis: A review of the standards proposed for inclusion in the code, ASME A112.18.8 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

P2905.14-RP-FEEHAN.DOC

Committee Action Hearing Results

For staff analysis of the content of ASME A112.18.8 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: Potable water piping can no longer be soldered, it has to be brazed based on the fact the material is used and the heat required to join piping. The proposal addresses this and provides the standard in which to use it by. It also addresses non-toxic and non-corrosive soldering.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2905.14 Soldered and brazed joints. Soldered joints in copper and copper alloy tubing shall be made with fittings approved for water piping and shall conform to ASTM B 828. Surfaces to be soldered shall be cleaned bright. Fluxes for soldering shall be in accordance with ASTM B813 ~~and shall become noncorrosive and non-toxic after soldering~~. Brazing fluxes shall be in accordance with AWS A5.31. The joints shall be properly fluxed and made with approved solder. Solders and fluxes used in potable water-supply systems shall have a lead content of not greater than 0.2 percent. Fluxes shall conform to ASTM B 813.

Commenter's Reason: ASTM B813 already requires fluxes to be non corrosive and non toxic after soldering. This additional language is not needed as how would an inspector verify this in the field?

RP114-13

Final Action: AS AM AMPC____ D

RP119-13
P2909 (New)

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new section and text as follows:

P2909
BRASS FITTINGS AND VALVES

P2909.1 Brass fittings and brass valves for plastic piping systems. Where used as components of plastic piping systems and where made from copper alloys, brass fittings and brass valves shall comply with NSF14.

Reason: Dezincification of yellow brass fittings and valves has become an expensive and widespread problem. In Las Vegas alone there are 32,000 houses that are being re-piped at a cost in excess of $300 million because of dezincification of brass fittings in PEX domestic water systems. Other parts of the country, e.g. southern California, Minnesota and Hawaii are also experiencing these failures. Failure of imported brass valves was experienced 20 years ago but corrective action taken at the time eliminated the problem. However, increasing use of imports by many companies and the deteriorating water quality in parts of the US has resulted in a 10 to 100-fold recurrence of this problem.

Since ASTM standards allow multiple copper alloys and the codes do not specifically define acceptable alloys for applications, some manufacturers choose an alloy based on cost. Brass valves and fittings made from these low-cost materials may be suitable for domestic water lines in Chicago, or drain lines, air lines or condenser water line in Las Vegas or San Diego but may fail in short order in a domestic water line in Las Vegas, San Diego or Honolulu and yet meet current codes.

This proposal provides a solution by clearly requiring compliance of all brass fittings and valves used in plastic piping systems to comply with the dezincification requirements of NSF 14. The dezincification test in NSF 14 has been accepted and used world-wide for over 30 years. The test is an effective, simple and inexpensive method for fitting and valve producers to sort corrosion-prone from corrosion-resistant alloys. Use of the dezincification performance standard in NSF 14 was developed and accepted by a broad base of fitting and valve producers and sellers. It provides a method to achieve the minimum material requirement necessary to prevent a repeat of the recent field failures that have resulted in class-action lawsuits.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 62 on the PMGCAC IRC-P list.

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

Analysis: This code change proposal references NSF Standard 14, which is already referenced in the code. However, the proposed change to code text is written to correlate with a new edition of the standard NSF Standard 14-2010a, rather than the edition presently referenced in the code, which is the 2008e edition. The update to this standard will be considered by the Administrative Code Committee during the 2013 Code Development Cycle. Should this code change proposal be approved, but the update to the standard not be approved, the code text will revert to the text as it appears in the 2012 Edition of the Code.

P2909 #1 (NEW)-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Disapproval**

Committee Reason: The subject of the proposal is already covered by Section P2609.3. The cost implications could be huge.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.

Commenter's Reason: We believe that the issue of dezincification of brass components is a serious issue that the code needs to require that brass fittings be dezincification resistant.

Public Comment 2:

Pennie L. Feehan, Pennie L. Feehan Consulting representing Copper Development Association (penniefeehan@me.com) requests Approval as Modified by this Public Comment

Modify the proposal as follows:

P2909
~~BRASS~~ COPPER ALLOY FITTINGS AND VALVES

P2909.1 ~~Brass~~ Copper alloy fittings and ~~brass~~ copper alloy valves for plastic piping systems. Where used as components of plastic piping systems and where made from copper alloys, ~~brass~~ fittings and ~~brass~~ valves shall comply with NSF14.

Commenter's Reason: Changing brass to copper alloy is consistent with other approved proposals. Dezincification testing and certification requirements were added to NSF 14 for plastic piping systems. NSF 14 was changed to reflect these requirements as a result of widespread failure of brass fittings and a large number of law suits across the United States. This proposed change to the IRC is required to update the language in the code to be consistent with changes to NSF 14.

RP119-13
Final Action: AS AM AMPC____ D

RP141-13

P3010 (New), Chapter 44

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

SECTION P3010
REPLACEMENT OF UNDERGROUND SEWERS
BY PIPE BURSTING METHODS

P3010.1 General. This section shall govern the replacement of existing building sewer piping by pipe-bursting methods.

P3010.2 Applicability. The replacement of building sewer piping by pipe bursting methods shall be limited to gravity drainage piping of sizes 6 inches and smaller. The replacement piping shall be of the same nominal size as the existing piping.

P3010.3 Pre-installation inspection. The existing piping sections to be replaced shall be inspected internally by a recorded video camera survey. The survey shall include notations of the position of cleanouts and the depth of connections to the existing piping.

P3010.4 Pipe. The replacement piping shall be of extra high molecular weight PE3408 material and shall be manufactured with an SDR of 17 and in compliance with ASTM F 714.

P3010.5 Pipe fittings. Pipe fittings to be connected to the replacement piping shall be of extra high molecular weight PE3408 material and shall be manufactured with an SDR of 17 and in compliance with ASTM D2683.

P3010.6 Cleanouts. Where the existing building sewer did not have cleanouts meeting the requirements of this code, cleanout fittings shall be installed as required by this code.

P3010.7 Post-installation inspection. The completed replacement piping section shall be inspected internally by a recorded video camera survey. The video survey shall be reviewed and approved by the code official prior to pressure testing of the replacement piping system.

P3010.8 Pressure testing. The replacement piping system as well as the connections to the replacement piping shall be tested in accordance with Section P2503.4.

Add standards to Chapter 44 as follows:

ASTM F 714-06a Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) based on Outside Diameter.

D2683-04 Standard Specification for Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

Reason: The IRC lacks coverage concerning the replacement of sewer systems by pipe bursting methods. These methods are being widely used throughout the country. Proper guidance concerning this type of replacement provides additional value to the code. This proposal to the 2015 IPC was Approved as Modified by Public Comment.
This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of

referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 69 on the PMGCAC IRC-P list.

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

P3010 (NEW)-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent's reason statement.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shawn Strausbaugh of Arlington County Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P3010.4 Pipe. The replacement piping shall be ~~of extra high molecular weight PE3408 and shall be~~ manufactured with an SDR of 17 and in compliance with ASTM F 714.

P3010.5 Pipe fittings. Pipe fittings to be connected to the replacement piping shall be ~~of extra high molecular weight PE3408 and shall be~~ manufactured with an SDR of 17 and in compliance with ASTM D2683.

Commenter's Reason: This proposal for the IPC was changed in the public comment period to remove the phrase "extra high molecular weight". We overlooked this in our original proposal and this public comment corrects this so that the IRC is coordinated with the IPC.

Public Comment 2:

Michael Cudahy of Plastic Pipe and Fitting Association (PPFA) representing the Plastic Pipe and Fitting Association (PPFA) (mikec@cmservnet.com) requests Approval as Modified by this Public Comment

Modify the proposal as follows:

P3010.4 Pipe. The replacement pip<u>e</u>~~ing~~ shall be ~~of extra high molecular weight~~ <u>made of a high density polyethylene (HDPE) that conforms to cell classification number</u> ~~PE3408~~ ~~material~~ <u>PE3608, PE4608 or PE4710 as indicated in ASTM F714.</u> <u>The pipe</u> ~~and~~ shall be manufactured with an SDR of 17 and in compliance with ASTM F 714.

P3010.5 Pipe fittings. Pipe fittings to be connected to the replacement piping shall be <u>made</u> of ~~extra high molecular weight~~ <u>a high density polyethylene (HDPE) that conforms to cell classification number</u> ~~PE3408~~ ~~material~~ <u>PE3608, PE4608 or PE4710 as indicated in ASTM F714. The pipe fittings</u> shall be manufactured with an SDR of 17 and in compliance with ASTM D2683.

Commenter's Reason: The section is a welcome addition to the code, but is in need of several updates to reflect current polyethylene nomenclature and materials.

The phrase "extra high molecular weight" has no meaning in this code, nor in the way the pipe resin is specified, and should be deleted. Changes to the methodology on how the classification numbers for polyethylene resin are specified have made the designation "PE3408" obsolete. Resins that could be used in this application include; PE3608, PE4608, and PE4710, which are the modern classification designations. SDR 17 pipe is the thinnest wall pipe that can be used.

RP141-13

Final Action: AS AM AMPC____ D

RP149-13
P2704.1, P2727.2, P2717.3, P3002.1, P3201.6, P3201.6.1 (New), P3005.2.9, P3005.2.10, P3102.1

Proposed Change as Submitted

Proponent: Ron George, Certified Plumbing Designer, President, Plumb-Tech Design & Consulting Services LLC. (Ron@Plumb-TechLLC.com)

Revise as follows:

P2704.1 General. Slip joints shall be made with an *approved* elastomeric gasket and shall be installed only on the inlet and outlet of an inline sanitary waste valve, a trap outlet, a trap inlet and within the trap seal. Fixtures with concealed slip-joint connections shall be provided with an access panel or utility space not less than 12 inches (305 mm) in its smallest dimension or other *approved* arrangement so as to provide access to the slip connections for inspection and repair.

P2717.2 Sink and dishwasher. A sink and dishwasher are permitted to discharge through a single 1-1/2 inch (38 mm) inline sanitary waste valve in accordance with Section P3201.6.1 or a trap. The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall be connected with a wye fitting to the sink tailpiece. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the sink tailpiece.

P2717.3 Sink, dishwasher and food grinder. The combined discharge from a sink, dishwasher, and waste grinder is permitted to discharge through a single 1-1/2 inch (38.1 mm) inline sanitary waste valve in accordance with Section P3201.6.1 or a trap. The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall connect with a wye fitting between the discharge of the food-waste grinder and the trap inlet, the inline sanitary waste valve or ~~to~~ the head of the food grinder. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the sink tail piece or the food grinder.

P3002.3.1 Drainage. Drainage fittings shall have a smooth interior waterway of the same diameter as the piping served. All fittings shall conform to the type of pipe used. Drainage fittings shall have no ledges, shoulders or reductions which can retard or obstruct drainage flow in the piping. Threaded drainage pipe fittings shall be of the recessed drainage type, black or galvanized. Drainage fittings shall be designed to maintain one-fourth unit vertical in 12 units horizontal (2-percent slope) grade. This section shall not be applicable to tubular waste fittings used to convey vertical flow upstream of an inline sanitary waste valve in accordance with Section P3201.6.1 or the trap seal liquid level of a fixture trap.

P3101.2.1 Venting required. Every *trap* and trapped fixture shall be vented in accordance with one of the venting methods specified in this chapter. Inline sanitary waste valves in accordance with Section P3201.6.1 shall not be required to be vented.

P3201.6 ~~Number of fixtures per~~ A trap or inline sanitary waste valve required for each fixture. Each plumbing fixture shall independently discharge to an inline sanitary waste valve in accordance with Section P3201.6.1 or to a *trap*.~~be separately trapped by a water seal trap.~~ The vertical distance from the fixture outlet to the *trap* weir shall not exceed 24 inches (610 mm) and the horizontal distance shall not exceed 30 inches (762 mm) measured from the center line of the fixture outlet to the centerline of the inlet of the *trap*. The height of a clothes washer standpipe above a *trap* shall conform to Section P2706.2. Fixtures shall not be double trapped.

Exceptions:

1. Fixtures that have integral traps.
2. A single trap shall be permitted to serve two or three like fixtures limited to kitchen sinks, laundry tubs and lavatories. Such fixtures shall be adjacent to each other and located in the same room with a continuous waste arrangement. The trap shall be installed at the center fixture where three fixtures are installed. Common trapped fixture outlets shall be not more than 30 inches (762 mm) apart.
3. Connection of a laundry tray waste line into a standpipe for the automatic clothes-washer drain shall be permitted in accordance with Section P2706.2.1.

P3201.6.1 Inline sanitary waste valves. Inline sanitary waste valves shall comply with ASME A112.18.8. Such valves shall be installed only on fixture outlets having 1-1/4 inch (31.8mm) or 1-1/2 inch (38.1 mm) outside diameter tubular waste piping. Valves conveying the waste from a food waste disposer shall be installed only in a vertical orientation. Such valves shall not be installed on the outlet of a urinal. The valves shall be installed in a vertical orientation or a horizontal orientation. Where installed in a horizontal orientation, the valve body shall be oriented with the ribs on the exterior of the valve body located on the bottom of the valve. The valves shall be *accessible*.

P3005.2.9 Cleanout size. Cleanouts shall be the same nominal size as the pipe they serve up to 4 inches (102 mm). For pipes larger than 4 inches (102 mm) nominal size, the size of the cleanout shall be not less than 4 inches (102 mm).

Exceptions:

1. Inline sanitary waste valves in accordance with Section P3201.6.1, "P" trap connections with slip joints or ground joint connections, or stack cleanouts that are not more than one pipe diameter smaller than the drain served, shall be permitted.
2. Cast-iron cleanouts sized in accordance with the referenced standards in Table P3002.3, ASTM A 74 for hub and spigot fittings or ASTM A 888 or CISPI 301 for hubless fittings.

P3005.2.10 Cleanout equivalent. An inline sanitary waste valve in accordance with Section P3201.6.1, a fixture trap or a fixture with integral trap, readily removable without disturbing concealed piping shall be acceptable as a cleanout equivalent.

P3102.1 Required vent extension. The vent system serving each *building drain* shall have at least one vent pipe that extends to the outdoors. Sanitary drainage systems that do not have traps and have only inline sanitary waste valves in accordance with Section P3201.6.1 shall be provided with at least one vent.

Add new standard to Chapter 44 as follows:

ASME
A112.18.8–2009 In-Line Sanitary Waste Valves for Plumbing Drainage

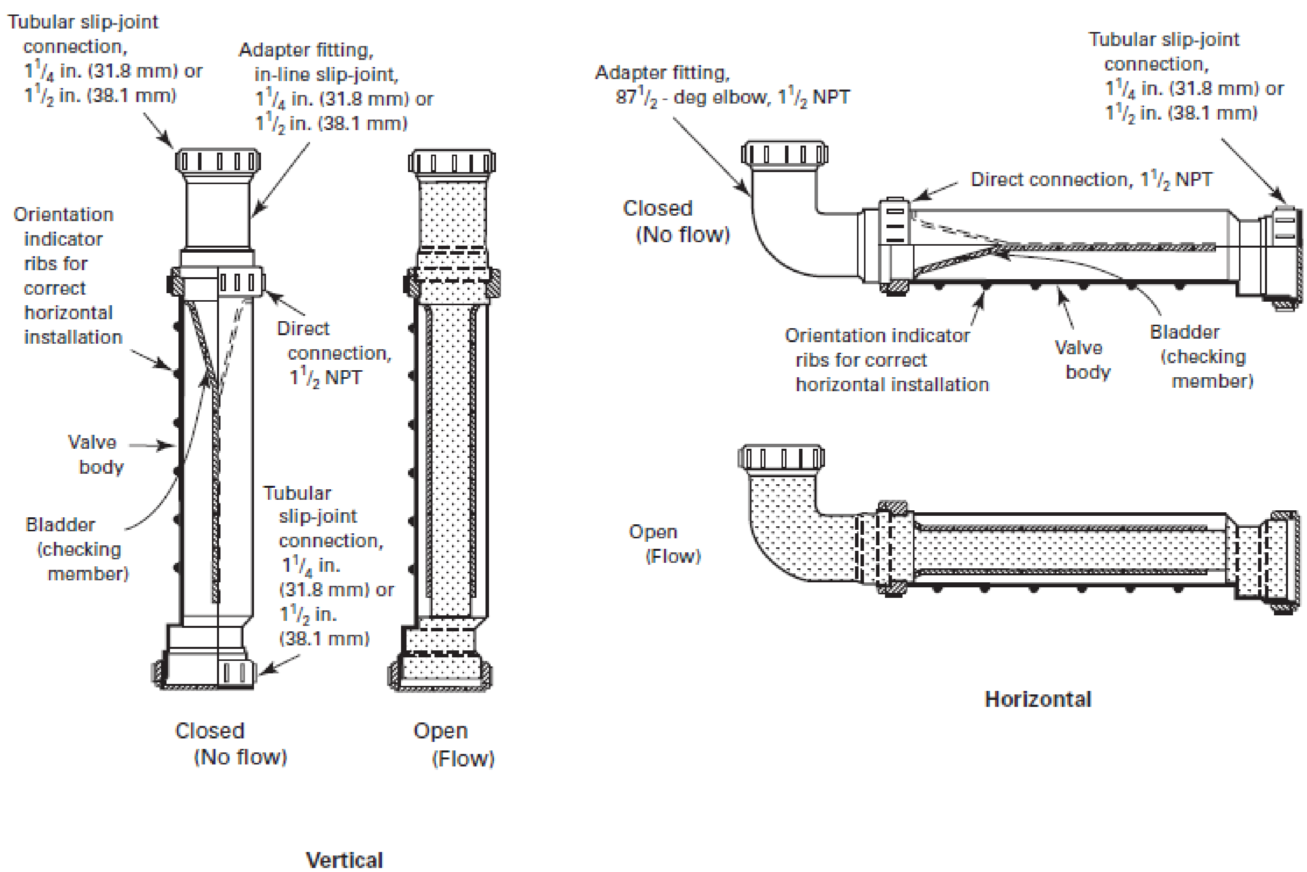
Reason: There is a new ASME standard ASME A112.18.8 that has been developed for sanitary waste valves and there are products that have been tested to meet or exceed the standard's requirements. Last year elastomeric trap seal protection devices were added to the IPC. This device is similar, but limited to tubular drains in lieu of a p-trap. It is not subject to floor wax and debris that a floor drain will receive. The key sections of this proposal are Section P3201.6 and new Section P3201.6.1 that add an alternative to liquid seal traps. All other sections being modified are in support of adding this alternative to the code. Inline sanitary waste valves can only be used on fixtures that have 1-1/4 inch or 1-1/2 inch OD tubular waste outlets from fixtures, so their application is generally limited to sinks, lavatories and bathtubs. The testing requirements of the standard for inline sanitary waste valves are stringent. In many applications, inline sanitary waste valves offer better, more reliable protection (against sewer gas coming out of a fixture) than a liquid seal trap.

In-Line sanitary waste valves now have an Industry standard ASME A112.18.8–2009 titled: "In-Line Sanitary Waste Valves for Plumbing Drainage". These devices have been tested and certified by third party testing labs and they have been proven over many years of use to provide a reliable gas-tight seal when used in lieu of a p-trap. They provide a seal which is not dependent on operating conditions and is not affected by evaporation or siphonage. These valves are mainly used in situations where sanitary fixtures see only occasional use, where freezing conditions, low humidity, persistent high temperature conditions, or where there are limited or confined space conditions. Examples include guest bathrooms, seasonal occupancy dwellings, manufactured housing and in remote cabins. Other common uses for this type of device are in Recreational Vehicles and boats for the freeze resistance and splash resistance. The performance requirements for the device are covered within the ASME A112.18.8 ANSI approved Standard, which includes a gas-tight seal test, flow rate test, long term cycling tests, a grease or lard test and many other chemical resistance and solids tests. These valves perform in a similar manner to a trap seal protection valve. Elastomeric type devices in the drainage system are already approved in the International Plumbing Code. In 2012 when the Trap Seal Protection Devices which comply with ASSE 1072 were approved for the 2015 International Plumbing Code at the final action hearings in Portland in 2012. These devices are very similar to trap seal protection valves except the ASME A112.18.8–2009 In-Line Sanitary Waste Valves for Plumbing Drainage limits their use to installations where a 1-1/4 inch or 1-1/2" tubular p-traps would normally be permitted. These devices are not intended for use on floor drains, water closets or similar fixtures.

The scope of the ASME A112.18.8 Standard establishes minimum requirements for materials in the construction of sanitary waste valves for use as an alternate to tubular p-traps, and prescribes minimum test requirements for the performance of the valve, together with methods of marking and identification. The ASME A112.18.8 Standard does not define the requirements for products to be used in urinals or water closets. It is not intended that products meeting this Standard will be used in a urinal or water closet.

ASME A112.18.8-2009

Fig. 1 Typical Cross-Section
(For Illustrative Purposes Only)



Testing includes the following tests:

3.1 Waterway Flow Rate
3.2 One-Way Sealing Performance of the Valve
3.3 Airway Flow Rate
3.4 Recovery From an Excess Back Pressure (Inversion) Condition
3.5 Leak Tightness
3.6 Thermal Cycling
3.7 Cyclic Fatigue
3.8 Resistance to Household Substances
3.9 Resistance to Chemicals and Solvents
3.10 Drop Test

3.11 Life Cycle

Section 4 of the Standard also covers Marking and Identification Instructions.

The valve shall be permanently and legibly marked with the following:

(a) manufacturer's name
(b) product name/brand name
(c) nominal size of inlet and outlet
(d) date of manufacture
(e) predominant material
(f) direction of flow indicator
(g) indication of the orientation of the installation of the device

4.2 Instructions

The manufacturer shall provide instructions on packaging or accompanying literature indicating, where appropriate, both of the following:

(a) the orientation of the installation of the device
(b) limitations on the use and type of drain-cleaning chemicals and tools

TECHNICAL DESIGN GUIDE

HepVO™

Sanitary Waste Valve

- A HYGIENIC ALTERNATIVE TO CONVENTIONAL TRAPS

HepVO is a self sealing valve designed to close the waste connection below a sanitary fixture to prevent the escape of foul sewer air into the dwelling.

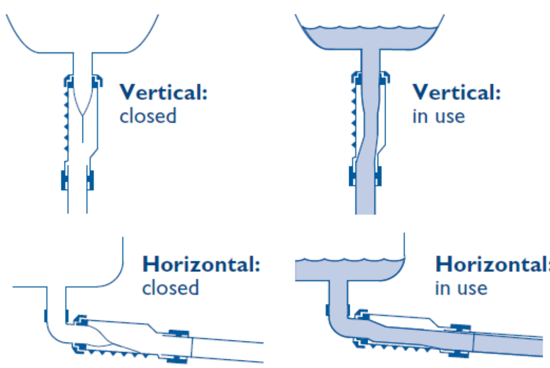
HepVO unlike conventional waste traps, does not rely on trapped water to create a seal. Water seals are prone to failure by Evaporation, Siphonage and other mechanisms. Instead, HepVO uses a self sealing membrane which performs the same function as a water seal trap but without the risk of depletion or freezing.

The HepVO Sanitary Waste Valve means enhanced plumbing design and system efficiency, without compromising performance or risking the escape of foul air into the living space from the drain or sewer.

HepVO - Operation

HepVO a Barrier between Living Space and the Drainage System.

Foul sewer gas must be prevented from entering the building. The loss of the water seal in a conventional trap can cause gurgling noises, objectionable smells, allow insect ingress, and has the potential to allow the spread of health hazards (such as SARS).



The HepVO Sanitary Waste Valve opens under the water pressure of a fixture emptying and closes to form a tight seal after the fixture has discharged.

HepVO - Product Features

- **Dry Seal Technology - cannot fail by evaporation or siphonage**
- **Admits Air - Auxiliary Venting Not Required**
- **One Way Valve - Prevents Foul Odors**

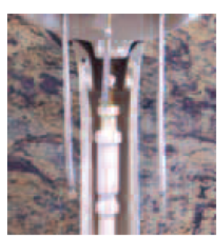
HepVO will out-perform a conventional trap by preventing the escape of foul air under excessive operating conditions up to 10 times greater than those normally experienced in a correctly designed Soil & Waste system. By comparison, conventional traps allow foul sewer air to bubble-through the seal at relatively low positive pressures.

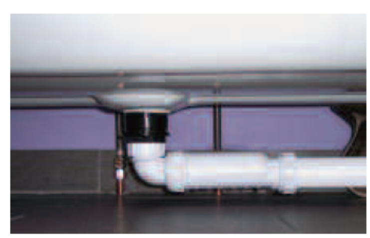
In addition because HepVO does not trap water that may contain food scraps or other waste, microbiological growth of a fungal, bacterial or viral nature is less likely.

HepVO - Applications

- Lavatories
- Bath Tubs
- Sink
- Bidet
- Washing Machine
- Garbage Disposal (Vertical Only)
- Urinal (Vertical Only)*
- Air Conditioning Condensate*
- Overflow
- Dishwasher
- Shower

* applications outside the scope of the ASME/ANSI A112.18.8 Standard and approval





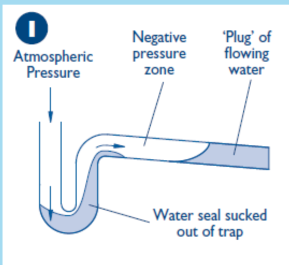
Minimizes the space required behind a lavatory or beneath a bath tub/shower tray.

HepvO - Design and Performance

The PROBLEM: Conventional waste traps work by having a water seal to prevent foul odors entering buildings. However a water trap can fail under a number of conditions.

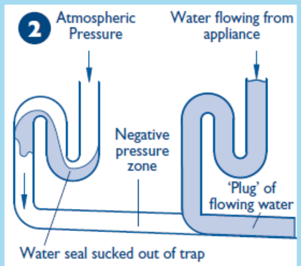
The following diagrams show several problems that result in loss of water seal, gurgling and foul smells.

Self Siphonage



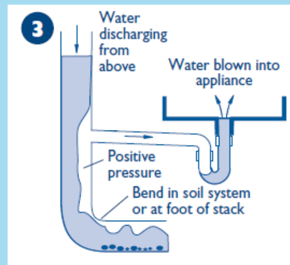
Self Siphonage: water flowing down the discharge pipe draws the water from the trap.

Induced Siphonage



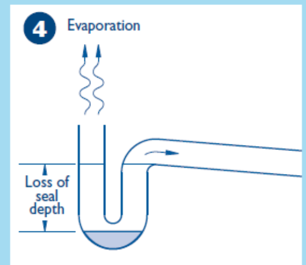
Induced Siphonage: the water seal is drawn out of the trap by water discharging from a fixture downstream (e.g. washing machine).

Compression



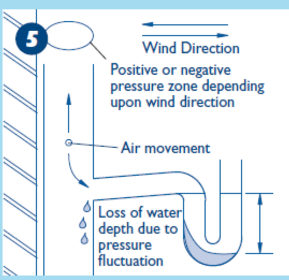
Compression: water is pushed out of the trap by a positive pressure caused by discharging of fixtures located above (e.g. WC).

Evaporation



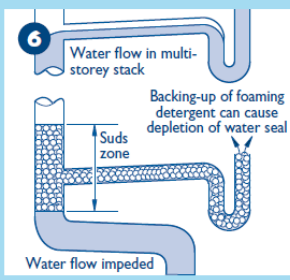
Evaporation: water in the trap evaporates during periods of non-use (e.g. during vacation or when fixtures are not being used).

Wind Effect (wavering out)



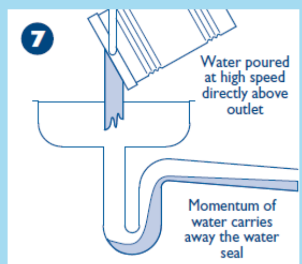
Wind Effect: air movement across the top of the Soil & Vent Pipe causes reciprocation of water in the trap and potential for loss of seal depth.

Foaming



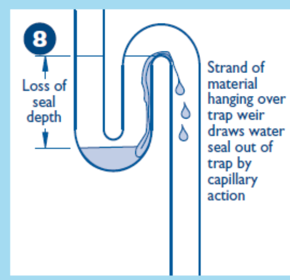
Foaming: agitation of waste water containing detergents in the Soil and Vent pipe creates foaming which pushes water out of the trap.

Momentum



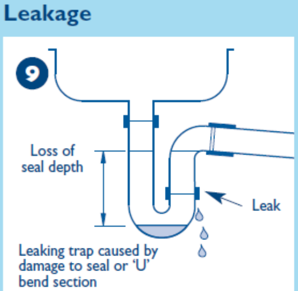
Momentum: waste water from a bowl or pail poured directly in to the waste outlet carries water out of the trap due to speed of discharge. This is also common with modern, funnel shaped basin designs.

Capillary Action



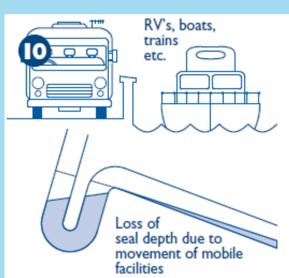
Capillary Action: fibrous material retained in the trap and hanging over the weir draws water out of the trap.

Leakage



Leakage: badly fitting or loose components and/or damaged seals can allow water to leak causing loss of seal depth.

Movement



Movement: In mobile facilities such as RV's and boats movement can cause potential for loss of water in the trap.

HepvO - The SOLUTION

When installed in accordance with manufacturer's instructions the unique HepvO Sanitary Waste Valve is the solution to all these problems.

HepvO provides a constant seal against sewer gas ingress, which is maintained under all normal operating conditions.

HepvO Sanitary Waste Valve actively eliminates negative pressure within the waste system by opening and allowing in fresh air until a state of equilibrium with atmosphere is reached.

HepvO Sanitary Waste Valve resists blockages, prevents nasty smells, gurgling sounds and stagnant water under all circumstances.

HepvO - Installation Benefits

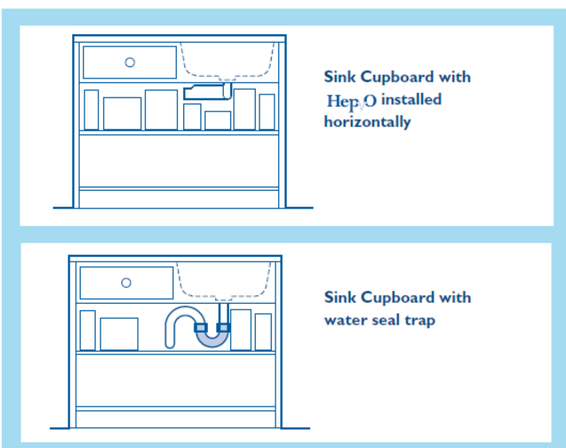
HepvO is a new concept in the prevention of foul air escaping into the building while actively eliminating negative pressure in soil and waste installations. It allows the designer greater flexibility on fixture and venting installation without compromising the performance of their sanitary seals.

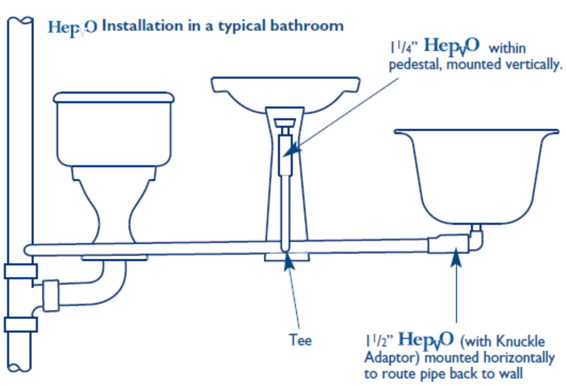
System Simplification - *Design Freedom and Economic Benefits*

Regulations for waste system design set limits on length and slope of pipes and the number of fixtures which can be connected to a waste pipe in order to keep pressure fluctuations to a minimum. This may be rectified by the incorporation of vent pipes at appropriate design locations.

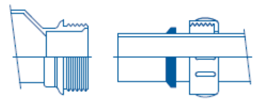
The incorporation of HepvO provides a good sanitary system offering minimum resistance to flow.

1. Compact design, flexibility of location and ability to actively eliminate negative pressure improves system performance.
2. A typical fixture will drain more quickly when a HepvO is installed compared to a p-trap installation. This helps keep downstream piping cleaner and reduces maintenance requirements.
3. There is no trap to vent distance limitations based on the slope of the pipe and the elevation of the vent connection.
4. Where necessary tight radius bends can be used, without fear of siphonage or compression.





HepvO - Installation & Maintenance



Capnut and sealing cone on pipe end ready for insertion of pipe into compression socket.

INSTALLATION

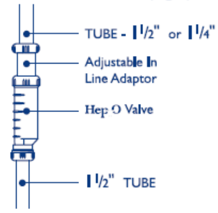
1. Cut the tube to length, allowing for the full compression socket depth, (preferably using an appropriate tube cutter).
2. If using plastic tube remove any loose material from the end. If using metallic tube remove any 'burr', and file if necessary to remove any external sharp edges. Mark the socket depth on the tube, and check that the tube section to be joined is free of any surface damage which may affect the joint seal.
3. Unscrew the cap from the outlet/inlet adaptor and slide the cap and rubber seal onto the tube.
4. Insert the tube end fully into the socket.
5. Slide the rubber seal and screwed cap up against the face of the socket, and tighten the cap by hand, (check that the cap is square to the body and does not 'cross-thread'), hand tight should be adequate to form a proper seal.
6. Threaded connections can be made to the inlet or outlet of the HepvO valve. At the outlet it is first necessary to remove the cap and rubber seal. If making connections to threaded components that do not have an integral seal (for example connection to DWV adaptors) PTFE/TEFLON tape should be applied to the thread prior to assembly.

MAINTENANCE

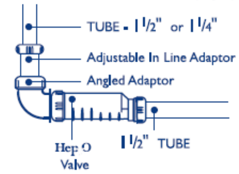
If mechanical devices such as spiral cables, rippers or water jetters are required to clear blockages in the waste system, the HepvO valve must be removed first.

It is good practice to rinse the HepvO valve with a little clean water before replacing it in the system.

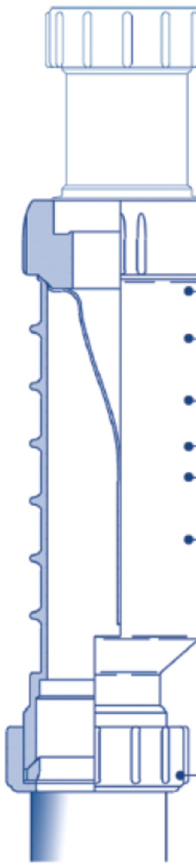
VERTICAL (Fig 1)



HORIZONTAL (Fig 2)



HepvO Valve Components



For further information on HepvO and other Hepworth products visit:
www.hepworth.co.uk

For all HepvO enquiries email:
sales@a-s-m.com

Hepworth PLASTICS

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Our policy is one of constant development.
Whilst this publication is accurate at the date of printing, specification/approvals may be changed in the interest of continued improvement.

Frequently Asked Questions

1 **Is HepvO used in addition to a conventional trap?**

NO, unlike other products which prevent foul odors entering the living space, HepvO is used instead of a conventional water-seal trap.

2 **Will I still need to install auxiliary venting on waste pipe branches?**

NO, HepvO acts as a highly effective local air admittance device, removing the need for secondary venting.

3 **Can I use acidic drain cleaning chemicals?**

YES, the HepvO valve is manufactured from a highly inert material and has passed extensive testing with a very wide range of chemicals including both acid and alkaline products.

4 **Do I still need to connect each fixture on its own dedicated waste branch?**

NO, HepvO prevents induced siphonage between adjacent fixture traps so it is now possible to make multiple connections on the same branch. This can save yards of tubing or piping and gives great flexibility for locating fixtures and designing waste systems.

5 **HepvO is a new product to me - how can I be confident that it will give a good installed performance?**

HepvO is new to the North American market but it is not a new product. It has been in volume production in the UK since 1997 and it is widely used in Europe, Australia and the Far East. It has attained numerous international approvals against very demanding standards and has achieved an enviable track record of trouble-free performance.

6 **Will HepvO promote better hygiene by stopping the escape of foul sewer air into habitable spaces?**

YES - The valve has been proven to perform under conditions in which traditional water seal traps are vulnerable to failure. It will continue to perform under back pressures 10 times greater than those experienced in correctly designed soil and waste systems.

7 **Does the air tight seal break down if a strand of cloth or hair collects in the strainer and falls down between the faces of the valve?**

NO - HepvO has undergone extensive foreign body testing (IAPMO IGC203-04). Tests show that the valve will maintain an air tight seal around an obstruction such as hair, fabric strands or spaghetti.

8 **What is the life expectancy of HepvO?**

Installed correctly HepvO can be expected to have a life expectancy at least equivalent to current water sealed traps. In addition HepvO is guaranteed against defects in materials or manufacturing for a period of 3 years.

9 **Will HepvO block easily for example if fat is discharged through it?**

NO - Extensive testing has shown that HepvO is less prone to blockage than traditional water seal traps. ***Note: because the 'straight through' design of HepvO does not trap debris discharged through the waste fixture care should be taken with jewelry and other valuables.***

10 **Will the seal be maintained even when the fixture hasn't been used for some time?**

YES - HepvO does not depend on a water seal and so it will continue to maintain a seal whether a fixture never gets used or is used very infrequently.

11 **Does the valve make a noise?**

Under normal conditions HepvO operates silently, unlike normal traps that are prone to 'gurgle'

12 **Will HepvO support microbiological growth?**

NO - The materials used to manufacture HepvO will not support microbiological growth for example mold and mildew.

TOLL FREE HELPLINE
800-241-5236

HepvO/USA/11/12/3528

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

Analysis: A review of the standards proposed for inclusion in the code, ASME A112.18.8 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

P3201.1-RP-GEORGE.doc

Committee Action Hearing Results

For staff analysis of the content of ASME A112.18.8 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides another option for a p-trap where conditions are not favorable for installation of a p-trap.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: The inline sanitary waste valve is a trap with moving parts which is prohibited by IRC section P3201.5. The proponent's reason statement compares this device to the trap seal protection device. These two devices are not the same and just because the trap seal protection device has been accepted into the 2015 IPC this does not mean these devices should also be accepted. The inline sanitary waste valve is the only means of preventing sewer gas from entering the structure as a trap seal protection device is secondary to the required trap. The trap seal protection device is intended to protect the trap seal from evaporation and not serve as the trap seal itself. The proponent also states that these devices have been proven over many years of use however the standard for these devices was only published in 2009.

RP149-13
Final Action: AS AM AMPC____ D

RP152-13
P3201.7, Table P3201.7

Proposed Change as Submitted

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3201.7 Size of fixture traps. ~~Fixture~~ Trap sizes for plumbing fixtures shall be ~~sufficient to drain the fixture rapidly and~~ ~~not less than the size~~ as indicated in Table P3201.7. Where the tailpiece of a plumbing fixture is larger than that indicated in Table P3201.7, the trap size shall be the same nominal size as the fixture tailpiece. A trap shall not be larger than the drainage pipe into which the trap discharges.

TABLE P3201.7
REQUIRED SIZES OF TRAPS ~~AND TRAP ARMS~~ FOR PLUMBING FIXTURES

PLUMBING FIXTURE	REQUIRED TRAP SIZE ~~MINIMUM~~ (inches)
Lavatory	1 ¼ or 1 1/2
~~Water closet~~	~~Note a~~

~~Consult fixture standards for trap dimensions of specific bowls.~~

(Portions of table not shown remain unchanged)

Reason: "Sufficient to drain the fixture rapidly" is unenforceable language. The trap sizes in the table should not be minimum sizes but required sizes because too large of trap doesn't allow for proper scouring and cleaning action in the trap. The term "trap arm" is slang. As a water closet has an integral trap, it should not be listed in the table so footnote a was deleted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 73 on the PMGCAC IRC-P list.

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

P3201.7-RP-HALL-PMGCAC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides necessary clarity for minimum trap size.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

David Beahm, Building Official Warren County Virginia, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) and VA Building Code Officials Association (VBCOA) (dbeahm@warrencountyva.net) requests As Modified by this Public Comment.

Modify the proposal as follows:

TABLE P3201.7
REQUIRED SIZES OF TRAPS FOR PLUMBING FIXTURES

PLUMBING FIXTURE	**~~REQUIRED~~ TRAP SIZE <u>MINIMUM</u> (inches)**
Lavatory	1 ¼ ~~or 1 ½~~

Commenter's Reason: The code change proposal as approved by the committee would in fact, further confuse what is intended by this section and table. By adding the word "required" and removing the word "minimum" in the table indicates this is what is required, but which is required for a lavatory, 1 ¼ or 1 ½ or possibly something larger because the added language indicates that if the tail piece is larger, the trap must be the same nominal size. This single item would now require three different sizes for the trap. By removing the proposed table language "required" and leaving "minimum in addition to removing the new size for the lavatory trap of 1 ½ the unintended consequences would not require three different sizes.

RP152-13

Final Action: AS AM AMPC____ D

RP155-13
P2905.9.1.2

Proposed Change as Submitted

Proponent: Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C. representing self (JBEngineer@aol.com)

Revise as follows:

P2905.9.1.2 Solvent cementing. Joint surfaces shall be clean and free from moisture~~,~~. Joints shall be made in accordance with the pipe, fitting or solvent cement manufacturer's installation instructions. Where such instructions require a primer to be used, ~~and~~ an *approved* primer shall be applied,~~.~~ and a solvent cement, orange in color and conforming to ASTM F 493, shall be applied to joint surfaces. Where such instructions allow for a one step solvent cement, yellow or red in color and conforming to ASTM F 493, to be used, the joint surfaces shall not require application of a primer before the solvent cement is applied. The joint shall be made while the cement is wet, and in accordance with ASTM D 2846 or ASTM F 493. Solvent cement joints shall be permitted above or below ground.

~~**Exception:** A primer is not required where all of the following conditions apply:~~

~~1. The solvent cement used is third-party certified as conforming to ASTM F 493.~~
~~2. The solvent cement used is yellow in color.~~
~~3. The solvent cement is used only for joining ½ inch (12.7 mm) through 2 inch (51 mm) diameter CPVC pipe and fittings.~~
~~4. The CPVC pipe and fittings are manufactured in accordance with ASTM D 2846.~~

Reason: This section is currently very convoluted. The requirements can be simplified by referencing the pipe manufacturer's installation instructions. The installation instructions are part of the listing which is required by the code. This will also recognize changes to the listing of the joining method, rather than requiring constant changing of this section.

The current requirements are incorrect since UL lists ASTM F442 for joining with one-step solvent cement. Furthermore, UL lists the joining for pipe up to 3 inch in diameter. Neither requirement is addressed in the current code text. UL also requires the solvent cement to be red in color. Hence, when doing a multipurpose piping system, the CPVC solvent cement would have to be red in color.

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

P2905.9.1.2-RP-BALLANCO.DOC

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: **Approved as Submitted**

Committee Reason: The proposal makes a needed cleanup of the language and informs the installer that a primer is not needed for smaller pipe sizes.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: Based upon what was submitted as part of the original change the incorrect language is shown – The title of P2905.9.1.2 is CPVC plastic pipe. It is unclear if the intent was to change this language as it is not underlined or struck or if this was just an editorial omission. The proponents reason states ASTM F 442 is the joining method per a UL listing for one step solvent cementing however this standard is not included in the proposed change. Was it the intent of the proponent to input the ASTM F 442 standard into this revised section as it is stated that the UL lists ASTM F 442 as the joining method for one step solvent cement? Will this section of the code now conflict with the UL listing of a specific piping system?

RP155-13
Final Action: AS AM AMPC____ D

RP157-13
P3111.1

Proposed Change as Submitted

Proponent: Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C. representing self (JBEngineer@aol.com)

Revise as follows:

P3111.1 Type of fixtures. A combination waste and vent system shall not serve fixtures other than floor drains, sinks, and lavatories. ~~A combination waste and vent systems shall not receive the discharge of a food waste grinder.~~

Reason: There is no technical justification for prohibiting a food waste grinder from discharging to a combination waste and vent system. A food waste grinder does not change the pressure in the piping system any differently than a sink operating without a food waste grinder. The food waste grinder will not impact the performance of the combination waste and vent system. A video was made showing the discharge from a food waste grinder. The video of the clear pipe shows the flow from a food waste grinder as being the same as the flow from the sink without a food waste grinder. Unfortunately, there is a mistaken belief that the discharge from a food waste grinder is a pumped waste.

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

P3111.1-RP-BALLANCO.DOC

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides more flexibility for plumbing installations. The test results prove that the restriction against food waste disposers on combination waste and vent was not justified.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: The use of food waste grinder on a combination waste and vent system was not permitted due to the lower flow velocities of these system due to the piping being oversized and the fact that semi solid material will be introduced to this portion of the drainage system which could lead to a build up and possible reduction in the pipe size and venting capabilities of this sanitary drainage and vent system. The video viewed shows a brand new piping system which is does not replicate conditions of piping that may be encountered in existing structures or in structures that have been in use for a period of time. It is inherent that the inner pipe walls will accumulate materials over time and this is exacerbated due to the low flow velocities of the combination drain and vent system and if permitted the discharge of a food waste grinder will only make this situation worse.

RP157-13
Final Action: AS AM AMPC____ D

SP1-13
105.3

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

105.3 Construction documents. *Construction documents*, engineering calculations, diagrams and other such data shall be submitted in two or more sets with each application for a *permit*. The *code official* shall require construction documents, computations and specifications to be prepared and designed by a registered design professional when required by state law. *Construction documents* shall be drawn to scale and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that the work conforms to the provisions of this code. <u>Manufacturer's instructions shall serve as *construction documents* for onground storable pools that are supplied by the manufacturer as a kit that includes all pipe, fittings and components.</u>

Reason: This change is necessary because construction documents for these types of pools are the instruction manuals themselves, there are not other type of *construction documents.* Therefore, if an onground storable pool is found to fall within the scope of this code, this change will provide that a construction document can consist of the instruction manuals for a fully self-contained on-ground storable pool.

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

105.3-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because it would limit the authority having jurisdiction from determining what constitutes acceptable construction documents for onground storable pools.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Submitted.

Commenter's Reason: The public comment alleviates an unnecessary and potentially costly burden on homeowners who install onground storable pools sold as a complete kit. These pools include detailed manufacturer instructions as provided in APSP-4, which serve the same purpose as *construction documents* in ensuring safe and proper installation.

SP1-13
Final Action: AS AM AMPC____ D

SP3-13
202

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

AQUATIC VESSEL. A vessel, permanent or temporary, intended for swimming, bathing, or wading and that is designed and manufactured to be connected to a *circulation system*. ~~Portable vessels 12 inches (305 mm) or less in designed water depth which are drained and filled daily are not considered aquatic vessels.~~ For purposes of this code, the term is used to identify all the types of vessels governed by this code, including: swimming pools, aquatic facilities, *spas* and hot tubs, and related equipment. Such vessels are either used in a *residential* application or in a public application.

Reason: The sentence being removed is unnecessary and only adds confusion as it leads the reader to think that vessels over 12 inches in water depth are aquatic vessels. If an aquatic vessel has a circulation system, then it is an aquatic vessel, no matter what the depth is. Whereas there are, for example, 18 inch portable vessels that are drained and filled daily and do not have a circulation system.

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

202-AQUATIC VESSEL #1-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was approved because the change makes an important clarification that the code only applies to pools and spas that have or are intended to have circulation systems.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Disapproval.

Commenter's Reason: Although we are in agreement with the committee action for the original proposal, requesting disapproval because it may no longer be necessary if the public comment for SP 4 is approved.

SP3-13
Final Action: AS AM AMPC____ D

SP4-13
202

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

POOL AND SPA ~~**AQUATIC VESSEL.**~~ A vessel, permanent or temporary, intended for swimming, bathing, or wading and that is designed and manufactured to be connected to a *circulation system*. Portable vessels 12 inches (305 mm) or less in designed water depth which are drained and filled daily are not considered aquatic vessels. For purposes of this code, the term is used to identify all the types of vessels governed by this code, including: *swimming pools*, *onground storable pools*, *aquatic recreation facilities*, *spas* and hot tubs, and related equipment. Such vessels are either used in a *residential* application or in a *public* application.

Reason: This proposal is being submitted due to the comments received from various I-code participants/users: builders, building departments, and others in the audience at the most recent I-code hearings for group A. There is a view that the term "aquatic vessel" is misleading or just not a good term because they associate it with a boat, not a pool. This concern resulted in a code proposal for the IBC, to reference the ISPSC and the new term, to not be adopted. Therefore, this proposal is offering a possible solution, to simply provide the term "pool and spa" to incorporate all the different pools and spas that exist.

Cost Impact: The code change proposal will not increase the cost of construction.

202-AQUATIC VESSEL #2-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

POOL ~~**AND**~~ **OR SPA.** A vessel, permanent or temporary, intended for swimming, bathing, or wading and that is designed and manufactured to be connected to a *circulation system*. Portable vessels 12 inches (305 mm) or less in designed water depth which are drained and filled daily are not considered aquatic vessels. For purposes of this code, the term is used to identify all the types of vessels governed by this code, including: *swimming pools*, *onground storable pools*, *aquatic recreation facilities*, *spas* and hot tubs, and related equipment. Such vessels are either used in a *residential* application or in a *public* application.

Committee Reason: The term "and" was changed to "or" because pools and spas are different constructions. There is not a construction that is both. The overall reason for approving the proposal was that the term "aquatic vessel" is misleading. The code needs to refer to these constructions by the names that are commonly used in the industry.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment

Further modify the proposal as follows:

Revise text as follows:

~~**POOL OR SPA.** A vessel, permanent or temporary, intended for swimming, bathing, or wading and that is designed and manufactured to be connected to a *circulation system*. Portable vessels 12 inches (305 mm) or less in designed water depth which are drained and filled daily are not considered aquatic vessels. For purposes of this code, the term is used to identify all the types of vessels governed by this code, including: *swimming pools*, *onground storable pools*, *aquatic recreation facilities*, *spas* and hot tubs, and related equipment. Such vessels are either used in a *residential* application or in a *public* application.~~

101.2 Scope. The provisions of this code shall apply to the construction, alteration, movement, renovation, replacement, repair and maintenance of ~~*aquatic vessels*~~ *aquatic recreation facilities*, *pools* and *spas*, The pools and spas covered by this code are either permanent or temporary, and shall be only those that are designed and manufactured to be connected to a *circulation system* and that are intended for swimming, bathing, or wading.

102.6 Moved ~~aquatic vessels~~ pools and spas. Except as determined by Section 102.2, systems that are a part of ~~*aquatic vessels*~~ *pools* or *spas* or systems moved into or within the *jurisdiction* shall comply with the provisions of this code for new installations.

BACKWASH CYCLE. The time required to *backwash* the filter medium and/or elements and to remove debris in the *pool* or *spa* *filter* ~~vessel~~.

BARRIER. A permanent fence, wall, building wall, or combination thereof that completely surrounds the ~~aquatic vessels~~ *pool* or *spa* and obstructs the access to the ~~vessel~~ *pool* or *spa*. Permanent shall mean "not being able to be removed, lifted, or relocated without the use of a tool."

EXERCISE SPA (Also known as a swim spa). Variants of a *spa* in which the design and construction includes specific features and equipment to produce a water flow intended to allow recreational physical activity including, but not limited to, swimming in place. Exercise *spas* can include peripheral jetted seats intended for water therapy, heater, circulation and *filtration* system, or can be a separate distinct portion of a combination spa/exercise spa and can have separate controls. These ~~aquatic vessels~~ *spas* are of a design and size such that it has an unobstructed volume of water large enough to allow the 99th Percentile Man as specified in APSP 16 to swim or exercise in place.

NONENTRY AREA. An area of the deck from which entry into the ~~vessel~~ *pool* or *spa* is not permitted.

~~SWIMMING~~ POOL. See "*public swimming pool*" and "*residential swimming pool*."

301.1 Scope. The provisions of this chapter shall govern the general design and construction of *public* and *residential* ~~*aquatic vessels*~~ *pools* and *spas* and all related piping, equipment, and materials. Provisions that are unique to a specific type of ~~*aquatic vessels*~~ *pool* or *spa* are located in Chapters 4 through 10.

304.2.1 ~~Aquatic vessels~~ Pools and spas located in designated floodways. Where ~~*aquatic vessels*~~ *pools* and *spas* are located in designated floodways, documentation shall be submitted to the *code official* that demonstrates that the construction of the ~~*aquatic vessel*~~ *pools* or *spas* will not increase the design flood elevation at any point within the jurisdiction.

304.2.2 ~~Aquatic vessels~~ Pools and spas located where floodways have not been designated. Where ~~*aquatic vessels*~~ *pools* or *spas* are located where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed ~~*aquatic vessel*~~ *pools* or *spas* and any associated grading and filling, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

305.1 General. The provisions of this section shall apply to the design of *barriers* for ~~*aquatic vessels*~~ *pools* and *spas*. These design controls are intended to provide protection against the potential drowning and near drowning by restricting access to such ~~vessels~~ *pools* or *spas*. These requirements provide an integrated level of protection against potential drowning through the use of physical barriers and warning devices.

Exceptions:

1. *Spas* and hot tubs with a lockable safety cover that complies with ASTM F 1346.
2. Swimming pools with a *powered safety cover* that complies with ASTM F 1346.

305.2.1 Barrier height and clearances. Barrier heights and clearances shall be in accordance with all of the following:

1. The top of the *barrier* shall be not less than 48 inches (1219 mm) above grade where measured on the side of the *barrier* that faces away from the ~~*aquatic vessel*~~ *pool* or *spa*. Such height shall exist around the entire perimeter of the ~~*vessel*~~ *pool* or *spa* and for a distance of 3 feet (914 mm) where measured horizontally from the required *barrier*.
2. The vertical clearance between grade and the bottom of the *barrier* shall not exceed 2 inches (51 mm) for grade surfaces that are not solid, such as grass or gravel, where measured on the side of the barrier that faces away from the ~~*vessel*~~ *pool* or *spa*.
3. The vertical clearance between a surface below the barrier to a solid surface, such as concrete, and the bottom of the required *barrier* shall not exceed 4 inches (102 mm) where measured on the side of the required barrier that faces away from the ~~*vessel*~~ *pool* or *spa*.
4. Where the top of the ~~*vessel*~~ *pool* or *spa* structure is above grade, the *barrier* shall be installed on grade or shall be mounted on top of the ~~*vessel*~~ *pool* or *spa* structure. Where the *barrier* is mounted on the top of the ~~*vessel*~~ *pool* or *spa*, the vertical clearance between the top of the ~~*vessel*~~ *pool* or *spa* and the bottom of the *barrier* shall not exceed 4 inches (102 mm).

305.3 Gates. Access gates shall comply with the requirements of Sections 305.3.1 through 305.3.3 and shall be equipped to accommodate a locking device. Pedestrian access gates shall open outward away from the ~~*vessel*~~ *pool* or *spa* and shall be self-closing and have a self-latching device.

305.3.3 Latches. Where the release mechanism of the self-latching device is located less than 54 inches (1372 mm) from grade, the release mechanism shall be located on the ~~*vessel*~~ *pool* or *spa* side of the gate at least 3 inches (76 mm) below the top of the gate, and the gate and *barrier* shall not have openings greater than $^1/_2$ inch (12.7 mm) within 18 inches (457 mm) of the release mechanism.

305.6 Natural barriers. In the case where the ~~*vessel*~~ *pool* or *spa* area abuts the edge of a lake or other natural body of water, public access is not permitted or allowed along the shoreline, and required *barriers* extend to and beyond the water's edge a minimum of 18 inches (457 mm), a *barrier* is not required between the natural body of water shoreline and the ~~*vessel*~~ *pool* or *spa*.

307.7 Colors and finishes. The colors, patterns, or finishes of the ~~*vessel*~~ *pool* or *spa* interior shall not obscure objects or surfaces within the ~~*vessel*~~ *pool* or *spa*.

Exception: *Residential pools* and *spas*.

307.8 Roofs or canopies. Roofs or canopies over ~~*aquatic vessels*~~ *pools* and *spas* shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1 and shall be constructed so as to prevent water runoff into the ~~*aquatic vessel*~~ *pool* or *spa*.

307.9 Accessibility. An accessible route to the public ~~*aquatic vessels*~~ *pool* or *spa* shall be provided in accordance with the *International Building Code*. Accessibility within the public ~~*aquatic vessels*~~ *pool* or *spa* shall be provided as required by the accessible recreational facilities provisions of the *International Building Code.* Accessibility for ~~*aquatic vessels*~~ *pools* and *spas* accessory to detached one- and two-family dwellings and townhouses not more than three stories in height shall be provided where required by the *International Residential Code*.

319.2 Chemical feeders. Where installed, chemical feed systems shall be installed in accordance with the manufacturer's specifications. Chemical feed pumps shall be wired so that they cannot operate unless there is adequate return flow to disburse the chemical throughout the ~~*vessel*~~ *pool* or *spa* as designed.

321.1 General. The provisions of Sections 321.2 and 321.3 apply to lighting for public ~~*aquatic vessels*~~ *pools* and *spas*. The provisions of Section 321.4 shall apply to *lighting* for *residential* ~~*aquatic vessels*~~ *pools* or *spas*.

608.1 Occupant load. The occupant load for the ~~*aquatic vessels*~~ *pools* or *spas* in the facility shall be calculated in accordance with Table 608.1. The occupant load shall be the combined total of the number of users based on the ~~*vessel*~~ *pool* or *spa* water surface area and the deck area surrounding the ~~*vessel*~~ *pool* or *spa*. The deck area occupant load shall be based on the occupant load calculated where a deck is provided or based on an assumed 4-foot-wide (1219 mm) deck surrounding the entire perimeter of the ~~*vessel*~~ *pool* or *spa*, whichever is greater.

610.6 Swimouts. *Swimouts* shall be located completely outside of the water current or wave action of the ~~*aquatic vessel*~~ *pool* or *spa* and can be located in shallow or deep areas of water.

801.1 Scope. The provisions of this chapter shall govern permanent inground *residential swimming pools* that are installed for *residential* use. This chapter covers new construction, modification or *repair* ~~and *residential aquatic vessels*~~.

Throughout the following sections of the code, replace the term "*aquatic vessel(s)*" with "*pool(s)* or *spa(s)*":

102.2
102.4
102.5
104.2
105.1
107.3
107.4
107.6
107.7.2
108.2.1
Section 202, under the following defined terms: "alteration","existing aquatic vessel", "repair"
305.2.5
305.2.10
305.4
305.7
308.3
309.1
311.2.1
311.4
311.9

313.7
322.1
323.1
409.2.2

Throughout the following sections of the code, replace the term "*aquatic vessel(s)*" with "*pool(s)* and *spa(s)*":

101.3
102.3
106.3
302.2
302.5
302.6
302.8
304.1
304.2
304.3
305.2
307.1
307.3
307.4
307.4.1
307.5
307.6
308.4
310.1
311.1
311.2
311.2.3
312.1
313.1
313.3
314.1
315.1
315.2
Table 315.3
315.4
316.1
316.4.2
317.1
319.1
607.1
608.2

Commenter's Reason: Even though the committee approved changing 'aquatic vessel' to 'pool or spa', it is still essential that the term 'aquatic vessel' be replaced in the remaining chapters to 'pool or spa' each of the many times it appears. That is why numerous sections are addressed in this single Public Comment. Otherwise there would be wide spread confusion in the pool industry and inspectors will have a difficult time enforcing the code. Therefore, we cannot afford to disapprove this proposal because we must eliminate 'aquatic vessel.' The committee was in agreement with that. This public comment provides for the complete path to properly eliminate the 'aquatic vessel' term and to ensure that the more common term, "pool or spa" or "pool and spa" or just "spa" is inserted as appropriate throughout the code. The definition "pool or spa" is deleted because what is defined has either been moved to the scope section of the code or already exists within definitions that already exist in Chapter 2, i.e. "pool," "residential swimming pool," "public swimming pool," "spa," and "aquatic recreation facility."

SP4-13
Final Action: AS AM AMPC____ D

SP12-13
202, 405.1

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

PUBLIC POOL. …..

CLASS A, COMPETITION POOL. A pool intended for use for accredited competitive aquatic events such as Federation Internationale De Natation (FINA), USA Swimming, USA Diving, USA Synchronized Swimming, USA Water Polo, National Collegiate Athletic Association(NCAA), National Federation of State High School Associations(NFHS). ~~The use of the~~ <u>Such</u> pool<u>s</u> <u>are often used</u> for <u>recreation and other water activities</u> in addition to ~~is not limited to~~ competitive events.

CLASS B, PUBLIC POOL. A pool intended for public recreational use <u>that is not identified in the other classifications of public pools.</u>

<u>**CLASS F.** Class F pools are wading pools and are covered within the scope of this code as set forth in Section 405.</u>

405.1 Wading pools. *<u>Class F</u>* wading pools shall be separate pools with an independent *circulation system* and shall be physically separated from the main pool. <u>Such</u> wading pools shall be constructed in accordance with Sections 405.2 through 405.6.

Reason: : A definition of wading pool was missing from the current ISPSC edition and this terminology follows the APSP-1 standard re-write on defining a wading pool as CLASS F and referencing the section of the standard that provides the specific requirements for the wading pool. Also updated CLASS A and CLASS B, per the APSP-1 rewrite.

Cost Impact: The code change proposal will not increase the cost of construction

202-PUBLIC SWIMMING POOL-SP-HATFIELD

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The last sentence for Class A, competition pool contains the word “often”. Those pools might not ever be used for recreation and other water activities.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Modify proposal as follows:

PUBLIC POOL. …..

> **CLASS A, COMPETITION POOL.** A pool intended for use for accredited competitive aquatic events such as Federation Internationale De Natation (FINA), USA Swimming, USA Diving, USA Synchronized Swimming, USA Water Polo, National Collegiate Athletic Association (NCAA), National Federation of State High School Associations (NFHS). ~~Such pools are often used for recreation and other water activities and in addition to competitive events.~~

405.1 Wading pools. *Class F* wading pools shall be separate pools with an independent *circulation system*, ~~and~~ shall be physically separated from the main pool, and~~. Wading pools~~ shall be constructed in accordance with Sections 405.2 through 405.6.

Commenter's Reason: The committee disapproved this code change due to wording within the original proposal that included "such" and "often," which was deemed by the committee as poor code language. The public comment removes that language and retains the intent of the original proposal. The last line in the Class A definition is not needed because it is commentary.

SP12-13

Final Action: AS AM AMPC____ D

SP13-13
202

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

SAFETY COVER. ~~A *barrier* intended to be completely removed before entry of users for swimming pools, *spas*, hot tubs or wading pools, attendant appurtenances and/or anchoring mechanisms that will, when properly labeled, installed, used, and maintained in accordance with the manufacturer's' published instructions These *covers* are either a power or manual type.~~ A structure, fabric or assembly, along with attendant appurtenances and anchoring mechanisms, that is temporarily placed or installed over an entire pool, spa or hot tub and secured in place after all bathers are absent from the water. A safety cover is intended to be completely removed before users enter the pool, spa or hot tub. A safety cover is not complete unless the placement, installation, securing and maintenance of such covers is in accordance with the manufacturer's instructions. The primary purpose for installation of a safety cover is to inhibit access to the contained body of water by children under five years of age so as to reduce the risk of drowning. Safety covers are designed to limit the amount of water, such as from rainwater and snowmelt, that could collect on the surface of the cover so as to reduce the risk of children drowning in the collected water. Such covers are either a power type or a manual type.

Reason: Currently does not follow the ASTM F 1346 cover standard definition (see Section 3.1.17) for safety cover and as currently written the sentence does not make sense. The changes above align with the ASTM standard and address the concern that the term "labeled" would be confused with "*listed* and *labeled*".

Cost Impact: The code change proposal will not increase the cost of construction.

202-SAFETY COVER-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The definition is much too long. The first sentence says what needs to be said for this term. The remainder of the wording should be, if necessary, put into the body of the code. Definitions need to be short and concise.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SAFETY COVER. A structure, fabric or assembly, along with attendant appurtenances and anchoring mechanisms, that is temporarily placed or installed over an entire pool, spa or hot tub and secured in place after all bathers are absent from the water. ~~A safety cover is intended to be completely removed before users enter the pool, spa or hot tub. A safety cover is not complete unless the placement, installation, securing and maintenance of such covers is in accordance with the manufacturer's instructions. The primary purpose for installation of a safety cover is to inhibit access to the contained body of water by children under five years of~~

~~age so as to reduce the risk of drowning. Safety covers are designed to limit the amount of water, such as from rainwater and snowmelt, that could collect on the surface of the cover so as to reduce the risk of children drowning in the collected water.~~ Such covers are either a power type or a manual type.

Commenter's Reason: The public comment addresses the committee's reason for disapproval, which was that the definition was too long. The wording that remains will provide the aim of the original proposal, which was to ensure consistency with the ASTM F 1346, 1991 edition, of the cover standard manufacturers must follow.

SP13-13
Final Action: AS AM AMPC____ D

SP19-13, Part I
303.1

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE ISPSC COMMITTEE, Part II WILL BE HEARD BY THE IECC-CE COMMITTEE, PART III WILL BE HEARD BY THE IECC-RE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I - ISPSC

Revise as follows:

303.1 ~~General~~ Pool and spa energy consumption. The energy consumption of ~~requirements for~~ pools and ~~inground permanently~~ ~~installed~~ *permanent residential spas* shall be controlled by the requirements ~~as specified~~ in Sections 303.~~2~~ 1.1 through 303.1.4. ~~and APSP 15. The energy requirements for residential portable electric spas shall be in accordance with APSP 14.~~

303.1.1 Residential pools and permanent residential spas. *Residential swimming pools* and *permanent residential spas* shall be in accordance with APSP-15.

303.1.2 Heaters. The electric power to heaters shall be ~~equipped~~ ~~with~~ controlled by ~~an~~ readily accessible ~~external~~ on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. ~~to allow the heater to be shutoff without adjusting the thermostat setting.~~ ~~Such switch shall be provided with ready access~~. Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots.

> ~~**Exception:** Portable residential spas and portable residential exercise spas.~~

303.1.3 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump~~s~~ motors according to a preset schedule shall be installed ~~with~~ for ~~on~~ ~~all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in timer~~s~~ switches shall be ~~deemed~~ in compliance with this section ~~requirement~~.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- or waste-heat recovery pool heating systems.
3. ~~Portable residential spas and portable residential exercise spas.~~

303.1.4 Covers. Outdoor heated pools and outdoor ~~inground permanently-installed~~ *permanent residential spas* shall be provided with a vapor retardant cover, a liquid cover or other *approved* vapor retardant means in accordance with 104.11.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

303.2 Portable residential spas. The energy consumption of electric-powered *portable residential spas* shall be controlled by the requirements of APSP 14.

Reason:
PART I: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Clarifies APSP-15 only applies to residential pools and inground spas.
3. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
4. Clarifications regarding on-off switches for heaters.
6. Consistent verbiage within the time switch requirements.
7. Provides for clarity that the cover requirements are only for outdoor pools.
8. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.

Cost impact: These code change proposals will not increase the cost of construction.

Analysis: Standards APSP 14 and APSP-15 are in the 2012 ISPSC.

303.1-SP-HATFIELD.DOC

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

PART I – ISPSC

Heard by the ISPSC Committee

Committee Action: Disapproved

Committee Reason: The proposal was disapproved because it does not give credit to heaters that have on-off switches integral to the product. Shutting off power to some controls might cause the control to revert back to factory settings. Covers are only required for outdoor pools and spas. Indoor pools and spas should also have covers. Liquid covers are relatively new but there are no standards for this type of product. A standard for this product should be available before it is required by the code.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

303.1 Energy consumption of pools and permanent spas. The energy consumption of pools and *permanent ~~residential~~ spas* shall be controlled by the requirements in Sections 303.1.1 through 303.1.~~4~~3.

~~**303.1.1 Residential pools and permanent residential spas.** *Residential swimming pools* and *permanent residential spas* shall be in accordance with APSP-15.~~

303.1.~~2~~1 Heaters. The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously-burning ignition pilots.

303.1.~~3~~2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in timer switches shall be deemed in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- or waste-heat recovery pool heating systems.

303.1.~~4~~3 Covers. Outdoor heated pools and outdoor *permanent ~~residential~~ spas* shall be provided with a vapor retardant cover~~, a liquid cover~~ or other *approved* vapor retardant means in accordance with Section 104.11.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

303.2 Portable ~~residential~~ spas. The energy consumption of electric-powered *portable ~~residential~~ spas* shall be controlled by the requirements of APSP 14.

303.3 Residential pools and permanent residential spas. The energy consumption of *residential swimming pools* and *permanent residential spas* shall be controlled in accordance with the requirements of APSP 15.

Commenter's Reason: As it stands now there are inconsistent energy efficiency requirements between the IECC and ISPSC, which is why this three part public comment is essential to ensure that these codes are consistent with ANSI approved APSP Standards. Otherwise code officials, owners, manufacturers and installers will be faced with conflicting and possibly incompatible language. The public comment addresses the ISPSC committee's concerns, some of which was addressed in the IECC parts of the proposal in Dallas by floor modification after the input received by the ISPSC committee under Part I. This public comment implements those IECC changes to the ISPSC (Part I) portion of the proposal, but makes further clarifications to all parts to ensure the two I-codes have consistent energy efficient requirements for pools and spas.

Specifically in regards to Part I of the proposal, the public comment addresses the ISPSC committees reason for disapproval by a) adding in the integral on and off switches for heaters (already done in the IECC), b) removing the specific reference to a liquid cover, and allowing the AHJ to determine what other "approved vapor retardant means" can be used consistent with Chapter 1 (already done in the IECC), and 3) clarifying which provisions apply to public as opposed to residential *pools or permanent spas or portable spas.* This last aspect is critical to ensure it is only residential pools and spas that must meet the APSP Standard, as intended by the Standard, and the remaining portions are for both public and residential.

Part II of the proposal simply modifies the committee action by correcting a section reference. Part III of the proposal clarifies what provisions apply to public versus residential *pools as opposed to permanent spas or portable spas* – ensuring consistency between the respective Codes and the APSP Standard, following the proposed modifications under Part I.

SP19-13, Part I

Final Action: AS AM AMPC____ D

SP19-13, Part II
IECC C404.7, C404.7.1, C404.7.2, C404.7.3, C404.8, Chapter 5

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE ISPSC COMMITTEE, Part II WILL BE HEARD BY THE IECC-CE COMMITTEE, PART III WILL BE HEARD BY THE IECC-RE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART II - IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.7 Pools and spa energy consumption ~~inground permanently installed spas.~~ (Mandatory). ~~Pools and inground permanently installed spas shall comply with Sections C404.7.1 through C404.7.3.~~ The energy consumption of pools and ~~inground~~ permanent residential spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.4.

C404.7.1 Heaters. The electric power to ~~all~~ heaters shall be ~~equipped~~ ~~with~~ controlled by a~~n~~ readily accessible ~~external~~ on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. ~~to allow the heater to be shutoff without adjusting the thermostat setting.~~ ~~Such switch shall be provided with ready access~~. Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots.

> ~~**Exception:** Portable residential spas and portable residential exercise spas.~~

C404.7.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed ~~with~~ for ~~on~~ ~~all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in time~~rs~~ switches shall be ~~deemed~~ in compliance with this section ~~requirement~~.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. ~~Where~~ Pumps that ~~are required to~~ operate solar- and waste-heat-recovery pool heating systems.

C404.7.3 Covers. Outdoor heated pools and outdoor ~~inground permanently-installed~~ permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other *approved* vapor retardant means.

> **Exception:** ~~A vapor-retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season.~~ Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

C404.8 Portable residential spas (Mandatory). The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

Add new standard to Chapter 5:

The Association of Pool & Spa Professionals
2111 Eisenhower Avenue
Alexandria, VA 22314

APSP

14-11 American National Standard for Portable Electric Spa Efficiency

Reason:

PART II Reason: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
3. Clarifications regarding on-off switches for heaters.
4. Consistent verbiage within the time switch requirements.
5. Provides for clarity that the cover requirements are only for outdoor pools.
6. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.
7. Provides for a new subsection to address portable residential spas in the rare case they would be used for more than a four story building and therefore fall under the commercial code.

Cost impact: These code change proposals will not increase the cost of construction.

Analysis: Standards APSP 14 and APSP-15 are in the 2012 ISPSC.

303.1-SP-HATFIELD.DOC

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

PART II – IECC - Commercial

Heard by the IECC-Commercial Provisions Committee

Committee Action: Approved as Modified

Modify the proposal as follows:

C404.7 Pools and permanent spa energy consumption (Mandatory). The energy consumption of pools and permanent ~~residential~~ spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.4.

C404.7.1 Heaters. The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously-burning ignition pilots.

C404.7.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches shall be in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

C404.7.3 Covers. Outdoor heated pools and outdoor permanent ~~residential~~ spas shall be provided with a vapor retardant cover~~, a liquid cover~~ or other *approved* vapor retardant means.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.
C404.8 Portable ~~residential~~ spas (Mandatory). The energy consumption of electric-powered portable ~~residential~~ spas shall be controlled by the requirements of APSP 14.

Committee Reason: The reason for making the modification is that this limits the energy requirements to permanent spas only. The reason for approving the overall proposal is that the proposal coordinates the energy requirements between the IECC and the ISPSC.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C404.7 Energy consumption of pools and permanent spas (Mandatory). The energy consumption of pools and permanent spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.~~4~~3.

Commenter's Reason: This public comment simply modifies the committee action by fixing a section reference. There is not a Section C404.7.4.

Public Comment 2:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org) requests Approval as Modified by this Public Comment

Further modify the proposal as follows:

C404.7.3 Covers. ~~Outdoor~~ Heated pools and outdoor permanent spas shall be provided with a vapor retardant cover or other *approved* vapor retardant means.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

Commenter's Reason: Without explanation or justification, the proposal as submitted would weaken current code language by removing the requirement that a pool cover be provided for all heated pools, whether located indoors or out. There is important value provided by a cover for an indoor pool, including humidity management, which has important energy implications. The modification in this comment would restore the current requirement that new heated indoor pools be provided with a vapor retardant cover.

SP19-13, Part II
Final Action: AS AM AMPC____ D

SP19-13, Part III

ECC R403.9 (IRC N1104.9), R403.9.1 (New) (IRC N1104.9.1 (New)), R403.9.2 (IRC N1104.9.2), R403.9.3 (IRC N1104.9.1.3), R403.9.4 (IRC N1104.9.1.4), R403.10 (New) (IRC N1103.10 (New)), Chapter 5 (IRC Chapter 44)

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE ISPSC COMMITTEE, Part II WILL BE HEARD BY THE IECC-CE COMMITTEE, PART III WILL BE HEARD BY THE IECC-RE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Part III - IECC-Residential Provisions

Revise as follows:

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R403.9 (N1104.9) Pools and spa energy consumption ~~inground permanently installed spas.~~ (Mandatory). ~~Pools and inground permanently installed spas shall comply with Sections R403.9.1 through R403.9.3.~~ The energy consumption of pools and ~~inground~~ permanent residential spas shall be controlled by the requirements in Sections R403.9.1 through R403.9.4.

R403.9.1 Residential pools and permanent residential spas. Swimming pools and permanent spas that are accessory to detached one- and two- family dwellings and townhouses 3 stories or less in height above ground plane and that are available only to the household and its guests shall be in accordance with APSP-15.

R403.9.2 (N1104.9.2) Heaters. The electric power to heaters shall be ~~equipped~~ ~~with~~ controlled by ~~an~~ readily accessible ~~external~~ on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. ~~to allow the heater to be shutoff without adjusting the thermostat setting. Such switch shall be provided with ready access~~. Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots.

R403.9.3 (N1104.9.3) Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed ~~with~~ for ~~on all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in tim~~ers~~ switches shall be ~~deemed~~ in compliance with this section ~~requirement~~.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. ~~Where~~ Pumps that ~~are required to~~ operate solar- and waste-heat-recovery pool heating systems.

R403.9.4 (N1104.9.4) Covers. Outdoor heated pools and outdoor ~~inground permanently-installed~~ permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other *approved* vapor retardant means.

Exception: ~~A vapor-retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season.~~ Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

R403.10 (N1103.10) Portable residential spas (Mandatory). The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

Add new standards to Chapter 5 (IRC Chapter 44):

The Association of Pool & Spa Professionals
2111 Eisenhower Avenue
Alexandria, VA 22314

APSP

14-11 American National Standard for Portable Electric Spa Efficiency

15-11 American National Standard for Residential Swimming Pool and Spa Energy Efficiency

Reason:

PART III Reason: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Clarifies APSP-15 only applies to residential pools and inground spas.
3. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
4. Clarifications regarding on-off switches for heaters.
5. Consistent verbiage within the time switch requirements.
6. Provides for clarity that the cover requirements are only for outdoor pools.
7. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.
8. Provides for a new subsection to address portable residential spas, requiring their compliance with the APSP-14 energy standard, consistent with the ISPSC.

Cost impact: These code change proposals will not increase the cost of construction.

Analysis: Standards APSP 14 and APSP-15 are in the 2012 ISPSC.

303.1-SP-HATFIELD.DOC

Committee Action Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

PART III – IECC – Residential

Heard by the IECC-Residential Provisions Committee

Committee Action: Approved as Modified

Modify the proposal as follows:

R403.9 (N1104.9) Pools and permanent spa energy consumption (Mandatory). The energy consumption of pools and permanent residential spas shall be controlled by the requirements in Sections R403.9.1 through R403.~~9.4~~ 9.3.

> **Exception:** ~~**R403.9.1 Residential pools and permanent residential spas.**~~ Heaters and time switches for swimming pools and permanent spas that are accessory to detached one- and two- family dwellings and townhouses 3 stories or less in height above ground plane and that are available only to the household and its guests shall be in accordance with APSP-15.

R403.9.~~2~~ 1 (N1104.9.~~2~~ 1) Heaters. The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously-burning ignition pilots.

R403.9.~~3~~ 2 (N1104.9. ~~3~~ 2) Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for ~~on~~ ~~all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in time switches shall be in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

R403.~~9.4~~ 9.3 (N1104. ~~9.4~~ 9.3) Covers. Outdoor heated pools and outdoor ~~permanent~~ residential spas shall be provided with a vapor retardant cover~~, a liquid cover~~ or other *approved* vapor retardant means.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required

Committee Reason: For the modification, the committee agreed with the testimony from the proponent of floor modification that heaters and time switches for pools and spas accessory to IRC-type buildings do not need to comply with the same, more stringent, requirements for commercial applications. For the overall proposal, the committee agreed with the proponent's reason statement.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.9 (N1104.9)) Pools and permanent spa energy consumption (Mandatory). The energy consumption of pools and permanent ~~residential~~ spas shall be controlled by the requirements in Sections R403.9.1 through R403.9.3.

~~**Exception:** Heaters and time switches for swimming pools and permanent spas that are accessory to detached one- and two-family dwellings and townhouses 3 stories or less in height above ground plane and that are available only to the household and its guests shall be in accordance with APSP-15.~~

R403.9.3 (N1104.9.3) Covers. Outdoor heated pools and outdoor permanent ~~residential~~ spas shall be provided with a vapor retardant cover or other *approved* vapor retardant means.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required

R403.10 (N110~~3~~4.10) Portable ~~residential~~ spas (Mandatory). The energy consumption of electric-powered portable ~~residential~~ spas shall be controlled by the requirements of APSP 14.

R403.11 (N1104.11) Residential pools and permanent residential spas. Residential swimming pools and permanent residential spas that are accessory to detached one- and two- family dwellings and townhouses 3 stories or less in height above grade plane and that are available only to the household and its guests shall be in accordance with APSP-15.

Commenter's Reason: This public comment simply clarifies what provisions apply to public versus residential pools as opposed to permanent spas or portable spas, also ensuring consistency between the respective codes.

Public Comment 2:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org) requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.9.3 (N1104.9.3) Covers. ~~Outdoor~~ Heated pools and outdoor residential spas shall be provided with a vapor retardant cover or other *approved* vapor retardant means.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required

Commenter's Reason: Without explanation or justification, the proposal as submitted would weaken current code language by removing the requirement that a pool cover be provided for all heated pools, whether located indoors or out. There is important value provided by a cover for an indoor pool, including humidity management, which has important energy implications. The modification in this comment would restore the current requirement that new heated indoor pools be provided with a vapor retardant cover.

SP19-13, Part III

Final Action: AS AM AMPC____ D

SP26-13
305.4

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the *barrier*~~,~~ and where any doors ~~and~~ or operable windows in the wall have ~~with a~~ sill heights of less than 48 inches (1219 mm) above the indoor floor ~~that~~ and where any of those doors or windows provide direct access to the *aquatic vessel* through the wall, ~~shall be equipped with~~ one ~~or more~~ of the following shall be required:

1. The doors and operable windows having a sill height of less than 48 inches (1219 mm) above the indoor floor shall have an alarm that produces an audible warning when the door, ~~or~~ window or their ~~its~~ screens ~~or window, is~~ are opened. The alarm shall be *listed* and *labeled* as a water hazard entrance alarm in accordance with UL 2017. In dwellings or structures not required to be Accessible units, Type A units or Type B units, alarm ~~the~~ deactivation switches shall be located 54 inches (1372 mm) or more above the threshold of the door. In dwellings or structures required to be Accessible units, Type A units or Type B units, alarm ~~the~~ deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the threshold of the door.
2. A safety cover that is *listed* and *labeled* in accordance with ASTM F 1346 is provided for the aquatic vessel.
3. An *approved* means of protection, such as self-closing doors with self-latching devices is provided. Such means of protection shall provide ~~that the~~ a degree of protection ~~afforded~~ that is not less than the protection afforded by Item~~s~~ 1 or 2.

Reason: How the charging paragraph originally was written, it did not make sense that doors and windows would be equipped with a safety cover, the proposed language clarifies what was the original intention

Cost Impact: The code change proposal will not increase the cost of construction.

305.4-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the *barrier*~~,~~ and where any doors or operable windows in the wall have sill heights of less than 48 inches (1219 mm) above the indoor floor and where any of those doors or windows provide direct access to the *aquatic vessel* through the wall, one of the following shall be required:

1. The doors and operable windows having a sill height of less than 48 inches (1219 mm) above the indoor floor shall have an alarm that produces an audible warning when the door, window or their screens are opened. The alarm shall be *listed* and *labeled* as a water hazard entrance alarm in accordance with UL 2017. In dwellings or structures not required to be Accessible units, Type A units or Type B units, alarm deactivation switches shall be located 54 inches (1372 mm) or more above the threshold of the door. In dwellings or structures required to be Accessible units, Type A units or Type B units, alarm deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the threshold of the door.
2. A safety cover that is *listed* and *labeled* in accordance with ASTM F 1346 is ~~provided~~ installed on ~~for~~ the aquatic vessel.
3. An *approved* means of protection, such as self-closing doors with self-latching devices is provided. Such means of protection shall provide a degree of protection that is not less than the protection afforded by Item~~s~~ 1 or 2.

Committee Reason: The reason for the modification is so the inspector can see that the cover fits properly at the time of inspection. The remainder of the proposal provides a necessary clarification that doors and windows do not require safety covers.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com) and Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org) request Approval as Modified by this Public Comment

Further modify the proposal as follows:

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the *barrier* ~~and where any doors or operable windows in the wall have sill heights of less than 48 inches (1219 mm) above the indoor floor~~ and where ~~any of those~~ doors or windows provide direct access to the *aquatic vessel* through ~~the~~ that wall, one of the following shall be required:

1. ~~The doors and~~ Operable windows having a sill height of less than 48 inches (1219 mm) above the indoor finished floor and doors shall have an alarm that produces an audible warning when the ~~door,~~ window, door or their screens are opened. The alarm shall be *listed* and *labeled* as a water hazard entrance alarm in accordance with UL 2017. In dwellings or structures not required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located 54 inches (1372 mm) or more above the ~~threshold of the door~~ finished floor. In dwellings or structures required to be Accessible units, Type A units or Type B units, the operable parts of the alarm deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the ~~threshold of the door~~ finished floor.
2. A safety cover that is *listed* and *labeled* in accordance with ASTM F 1346 is installed for the aquatic vessel.
3. An *approved* means of protection, such as self-closing doors with self-latching devices is provided. Such means of protection shall provide a degree of protection that is not less than the protection afforded by Item 1 or 2.

Commenter's Reason: The original proposal added the window sill height requirements to Item 1, therefore it no longer needs to be in the main paragraph. This clarifies the intent and application – which was the intent of the original proposal.

The language in Item 1 uses qualifier for doors and windows without consideration of what may not apply to both elements. One of our concerns it that this language could cause a misunderstanding regarding allowable door threshold height; thus the reordering of windows and doors. This makes it clear that the 48 inch sill is only associated with the window. The threshold of the door does not provide a location to measure for the windows. IBC Section 1008.1.9.2 uses 'finished floor', which would be an appropriate reference point for doors and windows. The reach concern is to the operable parts on the device, not the entire device. This is especially relevant for the Accessible, Type A and Type B units.

While not included in this proposal, since it is outside of the scope of the change, the language regarding height limits within Accessible, Type A and Type B units should also be in Section 305.3.3 for gates. See IBC Sections 1008.1.9.2 and 3109.4.7 for gate and door criteria. All three sections should be coordinated next round to include gates, doors and windows.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

SP26-13

Final Action: AS AM AMPC____ D

SP33-13
307.4, Table 307.4 (New), 502.1, Table 502.1

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

307.4 Materials and structural design. ~~The structural design of~~ *Aquatic vessels* shall conform to one or more of the standards indicated in Table 307.4. The structural design of aquatic vessels shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1 of this code.

TABLE 307.4
RESERVOIRS AND SHELLS

MATERIAL	STANDARD
Dry shotcrete	ACI 304.2, ACI 308, ACI 318, ACI 506.2
Fiberglass reinforced plastic	ANSI Z124.7
Plastic	ANSI Z124.7
Poured-in-Place Concrete	ACI 318
Stainless steel (type 316, 316L, 304, 304L)	ASTM A 240
Tile	ASC A108/A118/A136.1
Vinyl	ASTM D 1593
Wet Shotcrete	ACI 306, ACI 305, ACI 308, ACI 318, ACI 506.2

Delete without substitution as follows:

~~**502.1 Reservoirs and shells.** *Spa* and *exercise spa* reservoirs shall conform to one or more of the standards listed in Table 502.1.~~

~~**TABLE 502.1**~~
~~**RESERVOIRS AND SHELLS**~~

~~MATERIAL~~	~~STANDARD~~
~~Dry Shotcrete~~	~~ACI 304.2, ACI 308, ACI 506.2~~
~~Fiberglass Reinforced Plastic~~	~~ANSI Z124.7~~
~~Plastic~~	~~ANSI Z124.7~~
~~Poured-in-Place Concrete~~	~~ACI 318~~
~~Stainless Steel (Type 316, 316L, 304, 304L)~~	~~ASTM A 240~~
~~Tile~~	~~ASC A108/A118/A136.1~~
~~Vinyl~~	~~ASTM D 1593~~
Wet Shotcrete	ACI 306, ACI 305, ACI 308, ACI 506.2

Reason: It appears this table and requirement provided for in Section 502.1 for public spas and exercise spas was not provided for when addressing all other aquatic vessels. Therefore appears to be a need to submit under Chapter 3 and eliminating the requirements within Chapter 5.

Cost Impact: The code change proposal will not increase the cost of construction.

307.4-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: There are inconsistencies between what this table indicates as standards for the materials and what the IBC indicates the standards are for these materials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment

Modify the proposal as follows:

307.4 Materials and structural design. *Aquatic vessels* shall conform to one or more of the standards indicated in Table 307.4. The structural design of aquatic vessels shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1 of this code.

TABLE 307.4
RESERVOIRS AND SHELLS

MATERIAL	STANDARD
~~Dry shotcrete~~	~~ACI 304.2, ACI 308, ACI 318, ACI 506.2~~
Fiberglass reinforced plastic	ANSI Z124.7
Plastic	ANSI Z124.7
~~Poured-in-Place Concrete~~	~~ACI 318~~
Stainless steel (type 316, 316L, 304, 304L)	ASTM A 240
Tile	ASC A108/A118/A136.1
Vinyl	ASTM D 1593
~~Wet Shotcrete~~	~~ACI 306, ACI 305, ACI 308, ACI 318, ACI 506.2~~

~~**TABLE 502.1**~~
~~**RESERVOIRS AND SHELLS**~~

~~Wet Shotcrete~~	~~ACI 306, ACI 305, ACI 308, ACI 318, ACI 506.2~~

Commenter's Reason: This addresses the committee's reason for disapproval by removing the dry and wet shotcrete and poured in place concrete parts of Table 307.4, which are not necessary and if left in would make for inconsistencies, as they are already covered under the IBC and IRC.

The title for Table 502.1 is being shown again, even though it was struck out in the original proposal so that the last line in the table, "wet shotcrete", could be shown struck out. The error was discovered after the Report of Hearings so I included it in this public comment so that there wouldn't be any misunderstanding about what was intended.

SP33-13
Final Action: AS AM AMPC____ D

SP36-13

311.1, 312.1, 313.1, 315.1, 704.1 (New), 704.2 (New), 704.1, 704.2, 704.5 (New), 704.6 (New), 704.6.1 (New), 704.6.2 (New), 704.7 (New), 704.7.1 (New), 704.7.2 (New), 704.7.3 (New), 704.8 (New), 704.9 (New), 704.9.1 (New), 704.9.2 (New), 704.9.3 (New)

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

311.1 General. The provisions of this section apply to *circulation systems* for *aquatic vessels.*

Exceptions:

1. *Portable residential spas* and portable *residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes circulation system equipment that is accordance with Section 704.

312.1 General. The provisions of this section apply to *filters* for all *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and portable *residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes a filter that is in accordance with Section 704.

313.1 General. The provisions of this section apply to pumps and motors for *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and portable *residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes a pump and motor that is in accordance with Section 704.

315.1 General. The provisions of this section apply to *skimmers* for *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and portable *residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes a skimming system that is in accordance with Section 704.

704.1 General. A circulation system consisting of pumps, hoses, tubing, piping, return inlets, suction outlets, filters and other related equipment that provides for the circulation of water throughout the pool shall be located so that such items cannot be used by young children as a means of access to the pool.

704.2 Installation and support. Circulation equipment shall be installed, mounted and supported in accordance with the manufacturer's instructions.

704.3~~1~~ Draining the system. In climates subject to freezing, *circulation system* equipment shall be designed and fabricated to drain the pool water from the equipment and exposed piping, by removal of drain plugs and manipulating valves or by other methods in accordance with the manufacturer's instructions.

704.4~~2~~ Turnover. A pump including a motor shall be provided for circulation of the pool water. ~~Where *circulation equipment* is required by the manufacturer,~~ The equipment shall be sized to provide a turnover of the pool water ~~at least~~ not less than once every 12 hours. The system shall be designed to provide the required *turnover rate* based on the manufacturer's specified maximum flow rate of the filter, with a clean media condition of the filter. The system flow shall not exceed the filter manufacturer's maximum filter flow rate.

704.5 Piping and fittings. The process piping of the circulation system, including but not limited to hoses, tubing, piping, and fittings, shall be made of non-toxic material and shall be capable of withstanding an internal pressure of not less than 1½ times the rated pressure of the pump. Piping on the suction side of the pump shall not collapse when flow into such piping is blocked.

704.6 Filters. Pressure-type filters shall have an automatic internal means or a manual external means to relieve accumulated air pressure inside the filter tank. Filter tanks composed of upper and lower tank lids that are held in place by a perimeter clamp shall have a perimeter clamp that provides for a slow and safe release of air pressure before the clamp disengages the lids.

704.6.1 Automatic internal air relief. Filter tanks incorporating an automatic internal air relief as the principal means of air release shall be designed with a means to provide for a slow and safe release of pressure.

704.6.2 Separation tank. A separation tank used in conjunction with a filter tank shall have a manual air release or the tank shall be designed to provide for a slow and safe release of pressure when the tank is opened.

704.7 Pumps. Pool pumps shall be tested and certified by a nationally recognized testing laboratory in accordance with an edition of UL 1081 that is the latest edition published by UL at the time of manufacture of the pump. The pump horsepower rating and that rating indicated on the label cannot exceed the brake horsepower of the motor.

704.7.1 Cleanable strainer. Where a pressure-type filter is installed, a cleanable strainer or screen that captures materials such as solids, debris, hair and lint shall be provided upstream of the circulation pump.

704.7.2 Accessibile pumps and motors. Pumps and motors shall be accessible for inspection and service in accordance with the pump and motor manufacturer's instructions.

704.7.3 Pump shut-off valves. An *accessible* means of shut-off of the suction and discharge piping for the pump shall be provided for maintenance and removal of the pump.

704.8 Suction outlets and return inlets. Suction outlets and return inlets shall be provided and arranged to produce uniform circulation of water so that sanitizer residual is maintained throughout the pool. Where installed, submerged suction outlets shall conform to APSP 16.

704.9 Surface skimmer systems. The surface skimming system provided shall be designed and constructed to skim the pool surface when the water level is maintained between the minimum and maximum fill level of the pool.

704.9.1 Coverage when used as a sole outlet. Where surface skimmers are used as the only pool water outlet system, not less than one skimmer shall be provided for each 800 ft^2 (74.3 m^2), or fraction thereof, of the water surface area.

704.9.2 Coverage when used in combination with other outlets. Where surface skimmers are not the only outlet for pool water, they shall be considered to cover only that fraction of the 800 ft^2 (74.3 m^2).

704.9.3 Location and venting. Skimmers shall be equipped with a vent that serves as a vacuum break.

Reason: This change is consistent with APSP-4 that requires onground storable pools to follow different requirements than for all other pools.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: Regarding Section 704.7, ICC CP#28, Code Development, requires a specific edition of a standard for reference to allow understanding and approval of the detailed requirements proposed for the 2015 edition of the ISPSC. Further, the language proposed will enable variations on the specifications required on different projects.

311.1-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because there were numerous modifications that were proposed which were making the proposal very confusing. The final reason for disapproval was that the term "suction outlet" was used in several locations and it was felt that the word "suction" should not be used with "outlet". Not all outlets are directly connected to the suction side of a pump.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment

Modify the proposal as follows:

311.1 General. The provisions of this section apply to *circulation systems* for *aquatic vessels.*

Exceptions:

1. *Portable residential spas* and portable *residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes circulation system equipment that is in accordance with Section 704.

704.4 Turnover. A pump, including a motor, shall be provided for circulation of the pool water. The equipment shall be sized to provide a turnover of the pool water not less than once every 12 hours. The system shall be designed to provide the required *turnover rate* based on the manufacturer's specified maximum flow rate of the filter, with a clean media condition of the filter. The system flow shall not exceed the filter manufacturer's maximum filter flow rate.

704.7 Pumps. Pool pumps shall be tested and certified by a nationally recognized testing laboratory in accordance with ~~an edition of~~ UL 1081 ~~that is the latest edition published by UL at the time of manufacture of the pump.~~ ~~The pump horsepower rating and that rating indicated on the label cannot exceed the brake horsepower of the motor.~~

704.8 ~~Suction~~ Outlets and return inlets. ~~Suction~~ Outlets or suction outlets, and return inlets shall be provided and arranged to produce uniform circulation of water so that sanitizer residual is maintained throughout the pool. Where installed, submerged suction outlets shall conform to APSP 16.

Commenter's Reason: This public comment addresses the committee's concern about using the term "suction" to describe "outlet". Not all outlets from a pool are suction outlets. For example, a pool can be designed for proper circulation with the inlet to the pool near the bottom of the pool and the outlet being a skimmer (a gravity outlet) at the pool water surface. Changing the terminology in Section 704.8 allows for such an arrangement.

This public comment also removes language in the first sentence of Section 704.7: "that is the latest edition published by UL at the time of manufacture of the pump". The I-codes reference specific editions of standards because the code must refer to a specific document that becomes law, not some unknown moving target. Open–ended references to standards are not compatible with ICC format.

Another change in this public comment was to remove the second sentence of Section 704.7. Because APSP 15 (for energy efficiency of residential swimming pool systems) applies to onground storable pools (as required by Section 303.1) there is no need for this requirement in this chapter.

And finally, this public comment corrects a few typos in other proposed sections. The changes in this public comment along with the changes in the original proposal are necessary to ensure consistency with APSP-4, which provides specific requirements for onground storable pools.

SP36-13

Final Action: AS AM AMPC____ D

SP40-13
315.2, 315.3, 315.4

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

315.2 Required. A *surface skimming system* shall be provided for public aquatic vessels and shall be *listed* and *labeled* in accordance with NSF 50. Either a *surface skimming system* or a perimeter overflow system shall be provided for permanent inground *residential pools* and *permanent residential spas*. ~~The~~ Where installed, *surface skimming systems* shall be designed and constructed to create a skimming action on the pool water surface when the water level in the pool is ~~to skim the surface when the water level is maintained~~ within ~~the~~ operational parameters.

Exception: *Class D public pools* designed in accordance with Chapter 6.

315.2.1 Circulation systems. Public pool circulation systems shall be designed to process a minimum of 100 percent of the turnover rate through *skimmers*.

TABLE 315.3
SKIMMER SIZING TABLE

AQUATIC VESSEL	AREA PER SKIMMER (SQ. FT)
Public pool	~~400~~ 500
Residential pool	800
Spa (all types)	150

For SI: 1 square foot = 0.09 m^2.

Reason: This proposal tries to address several aspects:
- Section 315.2.1 doesn't follow what is in APSP-5 and in NSF 50. But 315.2.1 IS found in APSP-1, so the proposed change limits it to public pools.
- Regarding the NSF 50 aspect, after noting that all the APSP standards appear to require surface skimming systems to comply with NSF 50, added that aspect in the first sentence, but used the language as written in other areas of the ISPSC when requiring compliance with NSF 50.
- Added *permanent residential spas* in first sentence b/c APSP-3 states: 11.2 **Design and Construction**: Skimming devices shall be provided on all residential spas,…"
- Inserting "where installed" makes clear to the code official that, for example, the automatic surface skimmer isn't required necessarily, but where one is installed, it must follow certain specifications.
- See 12.3 in APSP 1, provides for 500 sq ft, so change in Table 315.2 makes the standard and what is in the ISPSC consistent

Cost Impact: The code change proposal will not increase the cost of construction.

315.2-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Exception No. 2 is too confusing. Maintained illumination appears to involve maintenance requirements. The code cannot be concerned with maintenance functions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob Eugene of UL LLC representing UL LLC request s Approval as Modified by this Public Comment

Modify the proposal as follows:

315.2 Required. A *surface skimming system* shall be provided for public aquatic vessels and shall be *listed* and *labeled* in accordance with NSF 50. Either a *surface skimming system* or a perimeter overflow system shall be provided for permanent in-ground *residential pools* and *permanent residential spas*. Where installed, *surface skimming systems* shall be designed and constructed to create a skimming action on the pool water surface when the water level in the pool is within operational parameters.

Exceptions:

1. *Class D public pools* designed in accordance with Chapter 6.
2. Skimmers that are an integral part of a spa that has been listed and labeled in accordance with UL1563 shall not be required to be listed and labeled in accordance with NSF 50.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: UL 1563 includes provisions for skimmers. Listing and labeling spas to UL 1563 provides for the required entrapment protection. Similar language has been included in the committee action for SP34-13 and SP35-13.

SP40-13

Final Action: AS AM AMPC____ D

SP42-13
202, 321.2, 321.2.1, 321.2.2, 321.2.3, 321.3, 321.4

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new definition:

MAINTAINED ILLUMINATION. The value, in foot-candles or equivalent units, below which the average illuminance on a specified surface is not allowed to fall. The average illuminance value on the specified surface at the time when maintenance of the lighting system must be carried out.

Revise as follows:

321.2 Artificial lighting required. When a pool is open during periods of low natural illumination, artificial lighting shall be provided so that all areas of the pool, including the ~~*main drains*~~ *suction outlets on the bottom of the pool,* will be visible. Illumination shall be sufficient to enable a lifeguard or other persons standing on the deck or sitting on a lifeguard stand adjacent to the pool edge to determine if a pool user is lying on the bottom of the pool and if the pool water is transparent and free from cloudiness.

These two conditions shall be met when all suction outlets are visible from the edge of the deck at all times when artificial lighting is illuminated and when an 8 inch (152 mm) diameter black disk, placed at the bottom of the pool in the deepest point, is visible from the edge of the pool deck at all times when artificial lighting is illuminated.

321.2.1 Pool and deck illumination. Overhead lighting, ~~or~~ underwater lighting or both shall be provided to illuminate the pool and adjacent deck areas. ~~Such~~ The lighting shall be *listed*~~,~~ and *labeled.* ~~And~~ The lighting shall be installed in accordance with NFPA 70. ~~or the *International Residential Code*, as applicable in accordance with Section 102.7.1.~~

321.2.2 Illumination intensity. For outdoor pools, ~~the~~ a combination of overhead and underwater lighting shall provide maintained illumination not less than 10 horizontal ~~3~~ foot-candles at the pool water surface. For indoor pools, ~~the~~ a combination of overhead and underwater lighting shall provide maintained illumination not less than 30 horizontal ~~of 10~~ foot-candles at the pool water surface. Deck area lighting for both indoor and outdoor pools shall provide maintained illumination not less than 10 horizontal foot-candles at the walking surface of the deck.

321.2.3 Underwater lighting. Underwater lighting shall provide not less than 8 lumens per square foot of pool water surface area.

Exceptions:

1. The requirement of this section shall not apply where the total wattage of incandescent underwater lighting is not less than ½ watt/ft^2 (5.4 watts/m^2) of pool water surface.
2. The requirement of this section shall not apply where overhead lighting provides not less than 15 foot-candles of *maintained illumination* at the pool water surface, the overhead lighting provides visibility, without glare, of all areas of the pool ~~are visible without glare,~~ and underwater lighting provides a *maintained illumination* at the pool water surface that is equal to or greater than the difference between the *maintained illumination* required by Section 321.2.2 and the *maintained illumination* provided at the pool water surface by the overhead lighting. Underwater lighting shall not be required where such difference is less than zero.

321.3 Emergency illumination. *Public pools* and <u>public</u> pool areas that operate during periods of low illumination shall be provided with emergency lighting <u>that will automatically turn on</u> to permit evacuation of the pool and securing of the area in the event of power failure. <u>Emergency lighting facilities shall be arranged to provide initial illumination that is not less than 0.1 foot-candle measured at any point on the water surface and at any point on the walking surface of the deck, and not less than an average of 1 foot-candle. At the end of the emergency lighting time duration, the illumination level shall be not less than 0.06 foot-candle measured at any point on the water surface and at any point on the walking surface of the deck, and not less than an average of 0.6 foot-candle. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded.</u> ~~The emergency lighting intensity shall be not less than 1 foot-candle at the water surface and the walking surface of the deck.~~

321.4 Residential pool and deck illumination. Where <u>lighting is</u> installed <u>for, and</u> in, *residential pools* and *permanent residential spas,* <u>such</u> <u>l</u>ighting shall be installed in accordance with NFPA 70 or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

Reason: The changes proposed are due to the following:

1. Deletes "main drain" to be consistent with definition now routinely used, which is "suction outlet." Further – can now DELETE the definition of main drain in Chapter 2 because this was the ONLY section in the ISPSC that utilized the word "Main Drain." See this proposal under Chapter 2 definitions.
2. Under 321.2.2 Illumination intensity, proposal changes the requirements to conform more to aspects of the Model Aquatic Health Code and IESNA RP-6-01 (Illuminating Engineering Society of North America), both of which include requirements for indoor and outdoor pools and decks (regardless of whether indoors or outdoors). This is a good approach for most general public pools.
3. Under 321.2.3 provides new language stemming from the APSP-1 revisions. It also incorporates a lumen-based standard made necessary by new low-power lighting technologies. Additionally, the existing wattage/sq ft requirement for incandescent underwater lights is maintained as an exception.
4. Under 321.3, made consistent with IBC Section 1006.3.1 Emergency illumination requirements.
5. Under 321.4, adding "lighting is" makes it clear as to what is being discussed. Adding "for, and in" makes it clear that coverage is for lighting in and out of the pool or spa.

Cost Impact: The code change proposal will not increase the cost of construction.

321.2-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: Exception No. 2 is too confusing. Maintained illumination appears to involve maintenance requirements. The code cannot be concerned with maintenance functions.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment

Modify the proposal as follows:

MAINTAINED ILLUMINATION. The value, in foot-candles or equivalent units, below which the average illuminance on a specified surface is not allowed to fall. ~~The average illuminance value on the specified surface at the time when maintenance of the lighting system must be carried out.~~ <u>Maintained illumination equals the initial average illuminance on the specified surface with new lamps, multiplied by the light loss factor (LLF), to account for reduction in lamp intensity over time.</u>

321.2 Artificial lighting required. When a pool is open during periods of low natural illumination, artificial lighting shall be provided so that all areas of the pool, including ~~the~~ <u>all</u> *suction outlets* on the bottom of the pool, will be visible. Illumination shall be sufficient to enable a lifeguard or other persons standing on the deck or sitting on a lifeguard stand adjacent to the pool edge to determine if a pool user is lying on the bottom of the pool and if the pool water is transparent and free from cloudiness.

These two conditions shall be met when all suction outlets are visible from the edge of the deck at all times when artificial lighting is illuminated and when an 8 inch (152 mm) diameter black disk, placed at the bottom of the pool in the deepest point, is visible from the edge of the pool deck at all times when artificial lighting is illuminated.

321.2.1 Pool and deck illumination. Overhead lighting, underwater lighting or both shall be provided to illuminate the pool and adjacent deck areas. The lighting shall be *listed* and *labeled.* The lighting shall be installed in accordance with NFPA 70.

321.2.2 Illumination intensity. For outdoor pools, any combination of overhead and underwater lighting shall provide maintained illumination not less than 10 horizontal foot-candles (10 lumens per square foot) [108 lux] at the pool water surface. For indoor pools, any combination of overhead and underwater lighting shall provide maintained illumination not less than 30 horizontal foot-candles (30 lumens per square foot) [323 lux] at the pool water surface. Deck area lighting for both indoor and outdoor pools shall provide maintained illumination not less than 10 horizontal foot-candles (10 lumens per square foot) [108 lux] at the walking surface of the deck.

321.2.3 Underwater lighting. Underwater lighting shall provide not less than 8 horizontal foot-candles (8 lumens per square foot) [86 lux] ~~of~~ at the pool water surface area, or not less than a total wattage of ½ watt/ft^2 (5.4 watts/m^2) of pool water surface for incandescent underwater lighting where the fixtures and lamps are rated in watts.

Exception~~s~~:

~~1. The requirement of this section shall not apply where the total wattage of incandescent underwater lighting is not less than ½ watt/ft^2 (5.4 watts/m^2) of pool water surface.~~

~~2.~~ The requirement of this section shall not apply where overhead lighting provides not less than 15 foot-candles (15 lumens per square foot) [161 lux] of *maintained illumination* at the pool water surface, the overhead lighting provides visibility, without glare, of all areas of the pool, and the requirements of Section 321.2.2 are met or exceeded ~~and underwater lighting provides a *maintained illumination* at the pool water surface that is equal to or greater than the difference between the *maintained illumination* required by Section 321.2.2 and the *maintained illumination* provided at the pool water surface by the overhead lighting. Underwater lighting shall not be required where such difference is less than zero~~.

Commenter's Reason: The public comment addresses the committee reasoning for disapproval by clarifying what is required under Section 321.2.3 and it revises the definition of *maintained illumination* to clarify that this is not a maintenance requirement. *Maintained Illumination* is a standard design quantity utilized in the lighting industry and defined by the Illuminating Engineering Society of North America (IESNA) standards and guidelines to represent the minimum amount of illumination that is allowed to exist given that the intensity of the artificial lighting will naturally decrease over time. *It* refers to a level of lighting which is evaluated at the initial planning and design stage, and not to any maintenance requirement or methodology. Use of this term therefore brings ISPSC into harmony with the standard definitions and practices used in the industry and reflected in the IESNA Standards and documents that are utilized by architects, engineers, lighting manufacturers, and installers when they design and install lighting systems. The public comment also ensures that all sections use both foot-candles and lumens. It also changes "the" to "all" in reference to suction outlets in Section 321.2 to ensure 1) that it remains consistent with APSP-7 as referenced in this Code, which provides that suction outlets are optional and 2) that when suction outlets are used, all are visible.

SP42-13

Final Action: AS AM AMPC____ D

SP44-13
323.2.1

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

323.2.1 Height. Handrails shall be between 34 inches (864mm) and 38 inches (965 mm) above the ramp or step surface as measured at the nosing of the step or finished surface of the slope.

<u>**Exception:** The requirements of this section shall not apply to *residential aquatic vessels.*</u>

Reason: What is the justification for this height range requirement applying to both public and residential installations? The 34"-38" height is already a requirement for stair and ramp rails in the ADA Standards for Accessible Design for public facilities. Many of rails do not meet the height requirements. The handrail height requirement should be removed from the general requirements section and placed into the public swimming pools section or exempt out the residential vessels, as proposed here. For inground residential swimming pools, the range for the rail height can be broader, or not specified.

Cost Impact: The code change proposal will not increase the cost of construction.

323.2.1-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal was disapproved because the handrail height dimensions have been proven to be the optimum dimensions for safety. The same level of safety should be provided for residential pools where handrails are installed.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment

Modify the proposal as follows:

323.2.1 Height. <u>The top of the gripping surface of handrails for public *pools and public spas*</u> shall be ~~between~~ 34 inches (864mm) ~~and~~ <u>to</u> 38 inches (965 mm) above the ramp or step surface as measured at the nosing of the step or finished surface of the slope. <u>The top of the gripping surface of handrails for residential *pools and* residential *spas* shall be 30 inches (762 mm) to 38 inches (965 mm) above the ramp or step surface as measured at the nosing of the step or finished surface of the slope.</u>

~~**Exception:** The requirements of this section shall not apply to *residential aquatic vessels.*~~

Commenter's Reason: The proposal was disapproved because the committee believed the same level of safety should be provided for residential pools as in public pools where handrails are installed. However, the 34" – 38" height requirement is derived solely from ADA Accessibility guidelines which apply only to public facilities, and bears no relationship to safety. Prior to the implementation of the ADA, public facilities relied on OSHA height requirements for handrails, which are were 30"-36". The OSHA requirements are based on safety, where the ADA requirements are based on accessibility. Therefore, the 34"-38" height specification should not be a requirement for a residential installation. Rather than provide an exception, this public comment simply clarifies that the 34-38 inches applies to public pools and then allows the 30-36 inch dimension for residential application.

It is important to note that the standard handrails that are sold into the residential market do not meet the 34"-38" requirements and if the code does not clarify that this only applies to public pool and spa handrails, a large number of products will have to be revised with great expense (whereas the commercial handrail product lines have made the change to the federal ADA requirements). The industry has been selling these standard rails for years and is not aware of any reports on injuries or safety issues or complaints related to the height of the products. The ADA requirement of 34-38 inches should not be applied to the residential market and this proposal makes that clarification all the while still providing for the safety that the committee was concerned about in their disapproval.

SP44-13

Final Action: AS AM AMPC____ D

SP47-13
406.4 (New), 406.5 (New)

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new text as follows:

406.4 Decks between pools and spas. Decks between pools, spas or any combination of pools and spas, shall have a width of not less than 6 feet (1829 mm).

406.5 Deck covering. Walking surfaces of decks within 4 feet (1219 mm) of a pool or spa that are not equivalent in the strength, durability and slip resistance of the surface of a concrete deck shall be prohibited. Wooden walking surfaces and carpeted walking surfaces shall not be placed within 4 feet (1219 mm) of a *pool.*

(Renumber subsequent sections)

Reason: These are requirements found in many state health codes and are considered construction; therefore should be included in the ISPSC.

Cost Impact: The code change proposal will not increase the cost of construction.

406.4 (NEW) -SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Disapproved**

Committee Reason: The slip resistance of the surface of a concrete deck is too vague. Concrete decks can have a variety of finishes, each having different slip resistances.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment

Modify the proposal as follows:

406.5 Deck covering. Walking surfaces of decks within 4 feet (1219 mm) of a pool or spa shall be *slip resistant.* ~~that are not equivalent in the strength, durability and slip resistance of the surface of a concrete deck shall be prohibited. Wooden walking surfaces and carpeted walking surfaces shall not be placed within 4 feet (1219 mm) of a *pool.*~~

Commenter's Reason: The proposal was disapproved because the slip resistance of the surface of a concrete deck was too vague. This public comment simplifies the proposal to require deck coverings to be slip resistant, which is then defined in the code.

SP47-13

Final Action: AS AM AMPC____ D

SP50-13
411.1

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

411.1 Entry and exit. Pools shall have ~~at least~~ not less than two means of entry and exit~~,~~ that are located so as to serve both ends of a pool. Chair lifts that provide for pool entry and exit by persons with physical disabilities shall not be counted as a means of entry or exit that is required by this section.

Reason: This language is included in the APSP-1 revisions and with new ADA requirements now in effect it is good to make this clarification.

Cost Impact: The code change proposal will not increase the cost of construction.

411.1-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

411.1 Entry and exit. Pools shall have not less than two means of entry and exit that are located so as to serve both ends of a pool. ~~Chair~~ Pool lifts that provide for pool entry and exit by persons with physical disabilities shall not be counted as a means of entry or exit that is required by this section.

Committee Reason: The reason for the modification is that "pool" lifts is the proper terminology, not chair lifts. The reason for approval of the overall change is that this provides a necessary clarification to the code so that lifts are not considered as the required means of exit and entry.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com) and Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org) request Approval as Modified by this Public Comment.

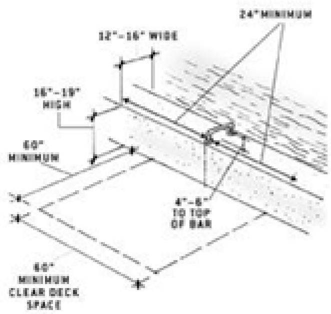
Further modify the proposal as follows:

411.1 Entry and exit. Pools shall have not less than two means of entry and exit that are located so as to serve both ends of a pool. Pool lifts, transfer walls and transfer system that provide for pool entry and exit by persons with physical disabilities in accordance with Section 307.9 shall not be counted as a means of entry or exit ~~that is~~ required by this section.

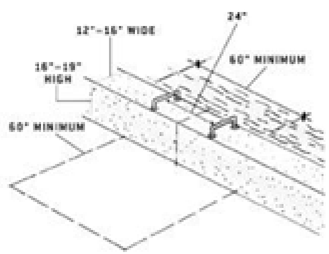
Commenter's Reason: We wish to further modify what was already approved because there are other entry options provided for in ICC A117.1 (and ADA) for persons with disabilities. See the pictures below for graphics of the three types that would not work for general entry.

Section 307.9 references the IBC for accessibility, which in turn references the ICC A117.1 for technical criteria for these three types of entries.

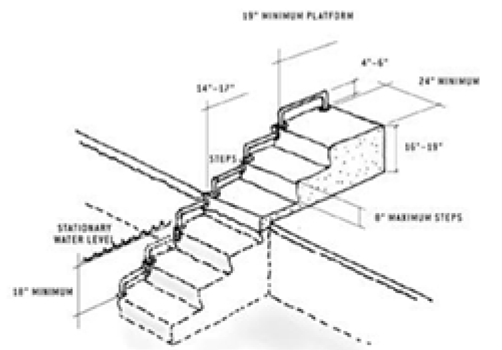
This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: http://www.iccsafe.org/cs/CTC/Pages/default.aspx. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.



TRANSFER WALL WITH ONE GRAB BAR



TRANSFER WALL WITH TWO GRAB BARS



TRANSFER SYSTEM PLATFORM AND STEPS

SP50-13
Final Action: AS AM AMPC____ D

SP59-13
702.2.1, Chapter 11

Proposed Change as Submitted

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

702.2.1 Barrier required. Ladders in the pool shall have a physical barrier to prevent children from swimming through the riser openings or behind the ladder. Ladders made by ladder manufacturers that provide a certification statement that their ladder meets the acceptance criteria for the entrapment tests of APSP 4 shall be considered to be in compliance with this section.

Add standard to Chapter 11:

APSP
APSP 4-2012 Standard for Aboveground/Onground Residential Swimming Pools

Reason: The change follows what is in the 2012 APSP-4 revisions; all the code official will need to see is the certificate.

Cost Impact: The code change proposal will not increase the cost of construction

702.2.1-SP-HATFIELD.DOC

Committee Action Hearing Results

Committee Action: Disapproved

Committee Reason: The committee disapproved this proposal because allowing the ladder manufacturer to provide the certification statement doesn't require that a third party verify that the ladder actually does meet the entrapment tests of APSP 4.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comments were submitted.

Public Comment 1:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by Public Comment

Modify the proposal as follows:

702.2.1 Barrier required. Ladders in the pool shall have a physical barrier to prevent children from swimming through the riser openings or behind the ladder. ~~Ladders made by ladder manufacturers that provide a certification statement that their ladder meets the acceptance criteria for the entrapment tests of APSP 4 shall be considered to be in compliance with this section.~~

> **Exception:** Barriers for the ladder shall not be required where the ladder manufacturer provides a test report by an *approved* third party testing agency certifying that the ladder complies with the ladder entrapment test requirements of APSP 4 or where the ladder is *listed* and *labeled* as complying with the requirements of APSP 4.

Commenter's Reason: This public comment is intended to maximize protection from ladder entrapment in all onground pool designs, including those for which a physical barrier is not practical. This issue was investigated at length by the ANSI/APSP-4 writing committee, resulting in the alternative compliance test. The test is conducted using a fully assembled ladder and pool wall, and is based on recognized biomechanical principles including the ASTM F1148-09 Standard for consumer playground safety. It ensures that a bather cannot be entrapped between the ladder risers or the ladder and pool wall. The test checks the spaces between the rungs as well as the space between the ladder and the pool wall.

Testing would be performed by an approved third party testing agency and the manufacturer would demonstrate compliance with either: 1) a test report included in the installation instructions, 2) a tag attached to the ladder with a link to where the test report and/or listing can be downloaded by the inspector, or 3) a label affixed to the ladder itself. As the original proposal noted, this alternative is found in the 2012 edition of the ANSI/APSP-4 Standard and is being added to ensure consistency with the ISPSC and the ANSI/APSP standards.

Public Comment 2:

Matthew Whalen, Director of Risk Management, representing Intex Recreation Corp requests Approval as Modified by Public Comment

Modify the proposal as follows:

702.2.1 Barrier required. Ladders in the pool shall have a physical barrier to prevent children from swimming through the riser openings or behind the ladder. ~~Ladders made by ladder manufacturers that provide a certification statement that their ladder meets the acceptance criteria for the entrapment tests of APSP 4 shall be considered to be in compliance with this section.~~

> **Exception:** Barriers for ladders shall not be required where the ladder manufacturer provides a certification statement that the ladder complies with the ladder entrapment test requirements of APSP 4.

Commenter's Reason: This public comment is intended to maximize protection from ladder entrapment in all onground pool designs, including those for which a physical barrier is not practical. This issue was investigated at length by the ANSI/APSP-4 writing committee, resulting in the alternative compliance test. The test is conducted using a fully assembled ladder and pool wall, and is based on recognized biomechanical principles including the ASTM F1148-09 Standard for consumer playground safety. It ensures that a bather cannot be entrapped between the ladder risers or the ladder and pool wall. The test checks the spaces between the rungs as well as the space between the ladder and the pool wall.

The public comment rewords the original proposal to clarify that the ladder entrapment test is an alternative to the physical barrier requirement found in 702.2.1, thereby providing consistency with the ANSI/APSP-4 Standard. Performance of the ladder entrapment test is readily within the capabilities of onground pool manufacturers, and therefore, as with virtually all other aspects of ANSI/APSP-4, this proposal recognizes self-testing and self-certification, which can be documented on the ladder or in contained product literature.

SP59-13

Final Action: AS AM AMPC____ D

WUIC2-13
503.2, Chapter 7

<u>Proposed Change as Submitted</u>

Proponent: Joseph Holland (jholland@frtw.com) and Dave Bueche (dbueche@frtw.com), representing Hoover Treated Wood Products, Inc. dbueche@frtw.com

Revise as follows:

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. <u>Material shall</u> <u>be tested on all sides with the</u> ~~E~~<u>e</u>xtended ASTM E 84 <u>(UL 723)</u> test~~ing~~ or <u>ASTM E2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch.</u> Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, <u>or ASTM E2768,</u> comply with the following:
   1.1 through 1.4 *(No change to current text)*

2 through 4 *(No change to current text)*

Add new standard to Chapter 7 as follows:

ASTM
<u>E2768-11</u> <u>Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 Minute Tunnel Test)</u>

Reason: The code is not specific as to the testing of materials with a surface treatment. There are painted and laminated products in the marketplace that are painted or laminated on only one side and are only tested on that side. This is inappropriate for many of the applications where "ignition-resistant material" is permitted; e.g., decks, lapped siding, exposed facia and other installations with a gap between the material.

The recommendations of the approved agencies for panel products require a 1/8 inch gap between sheets. Because panel products with a surface treatment will be cut in the field and are mandated a 1/8 inch gap it is important that non factory edges be tested to evaluate the effect of their performance in a fire.

ASTM developed a standard for testing materials for 30 minutes in the E84 or UL723 tunnel. Use of the standard is appropriate for "ignition-resistant material" used in the Wildland/Urban Interface. The standard uses E84 as the basis with the extended time period of 30 minutes

Cost Impact: As all products should be testing in this manner the will be no cost impact.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E2768-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

503.2-WUIC-BUECHE-HOLLAND

<u>Committee Action Hearing Results</u>

For staff analysis of the content of ASTM E2768-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the code change based on the proponent's reason statement.

Assembly Action: **None**

<u>Individual Consideration Agenda</u>

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Marcelo M Hirschler, GBH International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E 84 (UL 723) test or ASTM E2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch. Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, or ASTM E2768, comply with the following:

   1.1 through 1.4 *(No change to current text)*

   <u>**Exception:** Materials comprised of a combustible core and a noncombustible exterior covering shall not be required to be tested with a ripped or cut longitudinal gap.</u>

2. through 4. *(No change to current text)*

Add new standard to Chapter 7 as follows:

ASTM
E2768-11 Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 Minute Tunnel Test)

Commenter's Reason: The reason for the exception is that the rip or cut gap is intended to deal purely with materials that have a coating on a single side only instead of being treated for fire performance throughout the core of the material. It does not make sense to treat materials with a noncombustible outer layer, such as MCM materials (metal composite materials) or IMP panels (insulated metal panels) the same way as panels with combustible outer layers because such materials should not be damaged for testing. Such materials are manufactured in such a way as to protect the combustible cores and any damage to the face would render the material unusable and would require replacement in an actual application.

The intent of the use of the rip or cut gap is to avoid that a material passes the extended ASTM E84 (or ASTM E2768) test simply with an outer coating on a single side.

Public Comment 2:

Andrew Williams, PE, Metal Construction Association; William E. Koffel, PE, FSFPE, representing Alucobond and 3A Composites , request Approval as Modified by this Public Comment.

Modify the proposal as follows:

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the extended ASTM E 84 (UL 723) test or ASTM E2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch. Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, or ASTM E2768, comply with the following:

   1.1 through 1.4 *(No change to current text)*

   <u>**Exception:** Materials comprised of a combustible core and a noncombustible exterior covering, comprised of either aluminum at a minimum 0.019" thickness or corrosion resistant steel at a minimum 0.0149" thickness, shall not be required to be tested with a ripped or cut longitudinal gap.</u>

2. through 4. *(No change to current text)*

Add new standard to Chapter 7 as follows:

ASTM

E2768-11 Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 Minute Tunnel Test)

Commenter's Reason: The reason for the exception is that the rip or cut gap is intended to deal purely with materials that have a coating on a single side only instead of being treated for fire performance throughout the core of the material. It does not make sense to treat materials with a noncombustible outer layer, such as MCM materials (metal composite materials) or IMP panels (insulated metal panels) the same way as panels with combustible outer layers because such materials should not be damaged for testing. Such materials are manufactured in such a way as to protect the combustible cores and any damage to the face would render the material unusable and would require replacement in an actual application.

The specific noncombustible outer layers specified originate in Table 1405.2 of the IBC and correspond to minimum acceptable thicknesses of some specific weather coverings. An alternate more generic amendment is also being proposed.

The intent of the use of the rip or cut gap is to avoid that a material passes the extended ASTM E84 (or ASTM E2768) test simply with an outer coating on a single side and this proposed change does not modify that.

WUIC2-13

Final Action: AS AM AMPC____ D

WUIC3-13
503.2, Chapter 7

Proposed Change as Submitted

Proponent: John Woestman, Kellen Company, representing Composite Lumber Manufacturers Association (CLMA) (jwoestman@kellencompany.com)

Revise as follows:

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

~~1. Extended ASTM E 84 testing. Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, comply with the following:~~
   ~~1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall show no evidence of progressive combustion following the extended 30-minute test.~~
   ~~1.2. Flame front. Material shall exhibit a flame front that does not progress more than 101/2 feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.~~
   ~~1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:~~
      ~~1.3.1. Method A "Test Method for Accelerated Weathering of Fire-Retardant- Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant treated wood, wood-plastic composite and plastic lumber materials.~~
      ~~1.3.2. ASTM D 7032 for wood-plastic composite materials.~~
      ~~1.3.3. ASTM D 6662 for plastic lumber materials.~~
   ~~1.4. Identification. All materials shall bear identification showing the fire test results.~~

~~2~~1. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.
~~3~~2. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code*.
~~4~~3. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes which comply with the requirements of Section 1505.6 of the *International Building Code* and classified as Class A roof assemblies as required in Section 1505.2 of the *International Building Code*.
4. Exterior deck materials. Exterior deck materials complying with ASTM D7032 and the requirements of 4.1, or 4.2, or 4.3.
   4.1 Exterior deck materials complying with all of the following:
      4.1.1 Tested in accordance with ASTM E2632 and meeting the following acceptance criteria: peak heat release rate not greater than 25 kW/ft^2; and absence of sustained flaming or glowing combustion of any kind at the conclusion of the 40 minute observation period; and absence of structural failure of any deck board; and absence of falling particles that are still burning when reaching the burner or floor.
      4.1.2 Tested in accordance with ASTM E2726 / E2726M using the Class A brand and meeting the acceptance criteria of X1.6.1 or X1.6.2 of ASTM E2726 / E2726M.
      4.1.3 Tested in accordance with ASTM E84 and meeting the Class A flame spread index with the test extended by 20 minutes.
   4.2. Exterior deck materials complying with both of the following:

4.2.1 Tested in accordance with ASTM E2632 with a peak heat release rate not greater than 25 kW/ft^2.

4.2.2 Tested in accordance with ASTM E84 and meeting the Class B flame spread index.

4.3. Exterior deck materials installed where the exterior wall covering to which the deck is attached and within 10 feet of the deck is of noncombustible or ignition resistant material and the exterior deck materials complying with both of the following:

4.3.1 Tested in accordance with ASTM E2632 with a peak heat release rate not greater than 25 kW/ft^2.

4.3.2 Tested in accordance with ASTM E84 and meeting the Class C flame spread index.

Add new standards to Chapter 7 as follows:

ASTM

E2632-13 Standard Test Method for Evaluating the Under-Deck Fire Test Response of Deck Materials

E2726 / E2726M–12a Standard Test Method for Evaluating the Fire-Test-Response of Deck Structures to Burning Brands

Reason: This proposal introduces, in new Item 4 of Section 503.2, compliance alternatives for decking materials that are consistent with current California Building Code requirements for wildfire exposure (i.e. wildland urban interface areas), and deletes the existing text of Item 1, which would be redundant with the new text.

This proposal revises the IWUIC performance requirements for decking materials to incorporate two ASTM standards specifically developed for evaluating the fire performance characteristics of exterior decking materials. These two standards have been developed from current test requirements in the California building code. ASTM work product WK12052, which will become ASTM E2632-13, is currently at the society review status of approval. ASTM E2632 is commonly described as the under-deck fire test for exterior decks. ASTM E2726 / E2726M received final approval last year, and is commonly described as the burning brand test for exterior deck walking surfaces.

ASTM E2632 was developed from California's 2010 Building Code fire test 12-7A-4 Part A, and ASTM E2726 was developed from 12-7A-4 Part B.

The criteria of 4.1 is intended to be equivalent to the compliance "path" of the 2010 California Building code for wildfire exposure in 709A.3, Item 1. This criteria of 4.1 is similar to, but more stringent than, the criteria for "testing of alternative decking materials" of the San Diego County Consolidated Fire Code in Section 26.3.6.2.1, which is for the Wildland / Urban Interface Area. (Note: Criteria 4.1 would be consistent with San Diego County requirements if 4.1.2 is revised to a Class B brand, and 4.1.3 is deleted.)

The criteria of 4.2 is consistent with the 2010 California Building Code for wildfire exposure in the Exception to 709A.3. The criteria of 4.3 is consistent with the 2010 California Building Code for wildfire exposure in 709A.3, Item 4.

Cost Impact: None

Analysis: A review of the standards proposed for inclusion in the code, ASTM E2632-13 and ASTM E2726/E2726M-12a,with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

503.2-WUIC-WOESTMAN

Committee Action Hearing Results

For staff analysis of the content of ASTM E2632-13 and ASTM E2726/E2726M-12a relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: Disapproved

Committee Reason: The committee's disapproval was based on its concern that the proposal would inappropriately lower the standards for testing of exterior deck materials.

Assembly Action: None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

John Woestman, Kellen Company, representing Composite Lumber Manufacturers Association (CLMA), requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

504.7 Appendages and projections. *Unenclosed accessory structures* attached to buildings with habitable spaces and projections, such as decks, shall be a minimum of 1-hour fire resistance-rated construction, heavy timber construction or constructed of one of the following:

1. *Approved noncombustible* materials;
2. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code*; or
3. Ignition-resistant building materials in accordance with Section 503.2.
4. Deck boards, stair treads, guards, and handrails complying with 4.1 and 4.2, or comply with 4.3:
   - 4.1. Material weathered in accordance with ASTM D7032 and tested in accordance with ASTM E1354. The weathering shall not decrease the time to ignition by more than 15%, and shall not increase the effective heat of combustion by more than 15%, and shall not increase the peak heat release rate by more than 15%.
   - 4.2. Material tested in accordance with ASTM E2632 / E2632M with a peak heat release rate no greater than 25 kW/ft^2 (269 kW/m^2).
   - 4.3. Material tested in accordance with ASTM E2632 / E2632M after weathering as defined by ASTM D7032 with a peak heat release rate no greater than 25 kW/ft^2 (269 kW/m^2).

505.7 Appendages and projections. *Unenclosed accessory structures* attached to buildings with habitable spaces and projections, such as decks, shall be a minimum of 1-hour fire resistance-rated construction, heavy timber construction or constructed of one of the following:

1. *Approved noncombustible* materials;
2. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code*; or
3. Ignition-resistant building materials in accordance with Section 503.2.
4. Deck boards, stair treads, guards, and handrails complying with 4.1 and 4.2, or complying with 4.3:
   - 4.1. Material weathered in accordance with ASTM D7032 and tested in accordance with ASTM E1354. The weathering shall not decrease the time to ignition by more than 15%, and shall not increase the effective heat of combustion by more than 15%, and shall not increase the peak heat release rate by more than 15%.
   - 4.2. Material tested in accordance with ASTM E2632 / E2632M with a peak heat release rate no greater than 25 kW/ft^2 (269 kW/m^2).
   - 4.3. Material tested in accordance with ASTM E2632 / E2632M after weathering as defined by ASTM D7032 with a peak heat release rate no greater than 25 kW/ft^2 (269 kW/m^2).

Add new standards to Chapter 7 as follows:

ASTM

ASTM E1354-13 Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

ASTM E2632 / E2632M-13e1 Standard Test Method for Evaluating the Under-Deck Fire Test Response of Deck Materials

Commenter's Reason: This public comment is addressing testimony, comments, and questions received during the Committee Action Hearings (CAH) in Dallas in April, 2013.

This public comment does not modify the requirements for ignition-resistant building materials in Section 503.2. Also, this public comment moves proposed requirements to Section 504.7 (and Section 505.7) as suggested by opposition testimony at the CAH.

This public comment explicitly requires fire testing to evaluate the effects of weathering, as requested by testimony at the CAH, in criteria 4.1 and 4.3.

Additionally, the requirements of criteria 4.2 and 4.3 rely on a fire test specifically designed to test and evaluate the performance of deck components when constructed as a deck assembly in simulated WUI fire exposure (in contrast with the ASTM E84 test of Section 503.2 for ignition-resistant building materials). The test configuration and test requirements of ASTM E2632 of criteria 4.2 and 4.3 were developed specifically for deck materials in WUI applications.

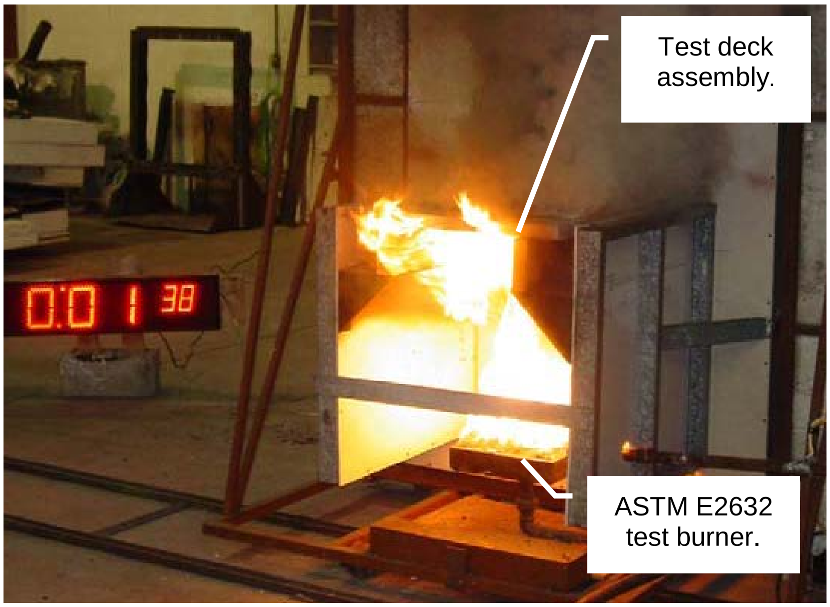
This public comment, as in the original proposal, is limited to deck boards, stair treads, guards, and handrails, and is focused on products tested to ASTM D7032. The requirements in this proposal complement existing IBC and IRC requirements, but are more rigorous than the current IBC and IRC requirements for deck boards, stair treads, guards, and handrails made of plastic composites, which are required by the IBC and the IRC to comply with ASTM D7032.

The ASTM E2632 test procedure requires constructing a small deck structure (joists and deck boards) consistent with the manufacturer's installation instructions, and this small deck structure is placed over a burner, which when ignited is designed to simulate a WUI fire occurring under the deck. The test deck structure is subject to the flame and heat from the burner for 3 minutes, and the performance of the deck structure is evaluated for the next 40 minutes.

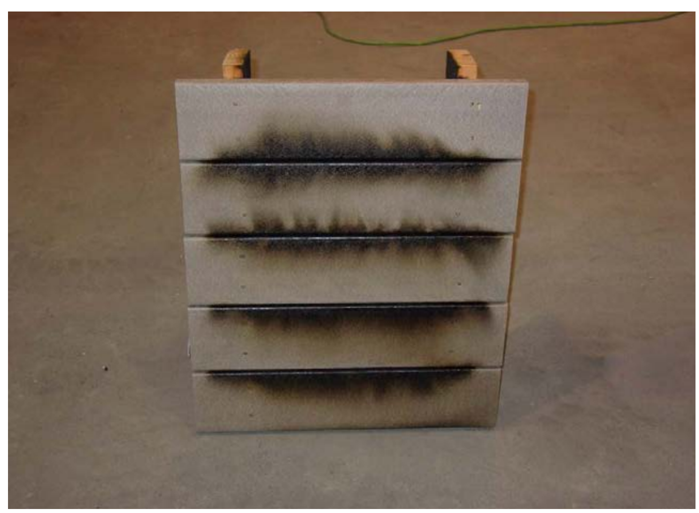
Below are pictures of the ASTM E2632 / E2632M test. Notice the configuration of this small test deck and the wall to which the deck is adjacent, simulating an actual installation of a deck attached to the structure.

Photo 1. ASTM E2632 under-deck test in progress.

The test deck assembly is subjected to the flame and heat of the burner for 3 minutes (80 kW), simulating a WUIC fire causing combustibles beneath a deck to burn.



After the 3-minutes of flame and heat from the burner, the test deck assembly is observed for 40 minutes and fire performance data is collected during this time period. This test deck assembly was stood on end after the fire test to illustrate the effects of a simulated WUI fire under the deck.



Photos courtesy Western Fire Center, Inc.

Photo 4. Test deck assembly ASTM E2632 fire test failure.
During the ASTM E2632 fire test 40-minute observation period, this test deck assembly had a peak heat release rate in excess of 25 kW/ft^2. This decking material would not meet the criteria for use in a WUI area as it exceeded the proposed maximum peak heat release rate.

Photo courtesy Fiberon,.

Analysis: ASTM D7032 is currently referenced in the IWUIC. ASTM E1354 is currently referenced in the IBC. ASTM E2632/ E2632M was submitted with the original proposal. For staff analysis of the content of ASTM E2632/ E2632M-13 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

WUIC3-13
Final Action: AS AM AMPC____ D

WUIC4-13
504.2, Chapter 7

Proposed Change as Submitted

Proponent: Marcelo M. Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

504.2 Roof covering. Roofs shall have a roof assembly that complies with a Class A rating when tested in accordance with ASTM E 108 or UL 790 ~~roof assembly~~. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.

Add new standard to Chapter 7 as follows:

ASTM
E108-11 Standard Test Methods for Fire Tests of Roof Coverings

UL
UL 790-2004 Standard Test Methods for Fire Tests of Roof Coverings with revisions through October 2008

Reason: This is basically simple clarification, to clarify the test method for the Class A rating. It adds the same ASTM and UL standards contained in the IBC for the application.

Cost Impact: None

Analysis: The standards proposed for inclusion in the code, ASTM E108-07a and UL 790-2004, are currently referenced in the IBC. Updates in year editions will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

504.2-WUIC-HIRSCHLER

Committee Action Hearing Results

For staff analysis of the content of ASTM E108.11 and UL 790-2004 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The approval was based on the committee's judgment that the proposal provides a needed clarification of exactly what standards are to be used in determining Class A roof assemblies. The committee also agreed with testimony that indicated that the IBC uses the same standards but goes a step further by including a list of acceptable materials for code user guidance. The committee suggested that a public comment could be submitted to duplicate such a list in this section rather than relying on a search in the IBC or IRC, especially since neither code is referenced in this section.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Marcelo M Hirschler, GBH International; Jason Thompson, National Concrete Masonry Association, representing Masonry Alliance for Codes and Standards, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

504.2 Roof covering. Roofs shall have a roof assembly that complies with a Class A rating when tested in accordance with ASTM E 108 or UL 790. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.

<u>**Exceptions:**</u>

1. <u>Class A roof assemblies include those with coverings of brick, masonry or an exposed concrete roof deck.</u>
2. <u>Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on noncombustible decks or ferrous, copper or metal sheets installed without a roof deck on noncombustible framing.</u>
3. <u>Class A roof assemblies include minimum 16 oz/sq. ft. (0.0416 kg/m^2) copper sheets installed over combustible decks.</u>

Add new standards to Chapter 7 as follows:

ASTM
E108-11 Standard Test Methods for Fire Tests of Roof Coverings

UL
UL 790-2004 Standard Test Methods for Fire Tests of Roof Coverings with revisions through October 2008

Commenter's Reason:
Hirschler: The exceptions shown are copied from the IBC and would comply with the committee's suggestion that they be added for consistency.

IBC reads as follows:

1505.2 Class A roof assemblies. Class A roof assemblies are those that are effective against severe fire test exposure. Class A roof assemblies and roof coverings shall be *listed* and identified as Class A by an *approved* testing agency. Class A roof assemblies shall be permitted for use in buildings or structures of all types of construction.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry or an exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on noncombustible decks or ferrous, copper or metal sheets installed without a roof deck on noncombustible framing.
3. Class A roof assemblies include minimum 16 oz/sq. ft. (0.0416 kg/m^2) copper sheets installed over combustible decks.

Thompson: Code change WUIC4-13 placed requirements in the Wildland Urban Interface Code (WUIFC) to specify the testing requirements for Class A roof assemblies consistent with the International Building Code (IBC). During the 1st public hearing it was pointed out to the Code Development Committee that the proposal did not include the provisions for roof assemblies and covering that are exempt from the testing requirements in the exceptions to Section 1505.2. The Code Development Committee approved the original proposal and encouraged a public comment be submitted to make this section of the WUIFC consistent with the IBC for Class A roof assemblies. This proposal accomplishes that goal by adding those roof assemblies and coverings permitted by the IBC as acceptable systems to meet the Class A requirements.

WUIC4-13
Final Action: AS AM AMPC____ D

WUIC5-13
504.10

Proposed Change as Submitted

Proponent: John D. Nicholas, Perceptive Solutions LLC (john@perceptivesolutionsllc.com)

Revise as follows:

504.10 Vents. Attic ventilation openings, foundation or underfloor vents, or other ventilation openings in vertical exterior walls and vents through roofs shall not exceed 144 square inches (0.0929 m^2) each. Such vents shall be ~~covered with noncombustible corrosion-resistant mesh with openings not to exceed 1/4 inch (6.4 mm), or shall be designed~~ protected with materials or devices that prevent the passage of flame, hot gases, and embers sufficient to ignite cotton waste when tested using the Cotton Pad Test of ASTM E119 and *approved* to prevent flame, hot gases ~~or~~ and ember penetration into the structure.

Reason: This proposed code change introduces similar language used by the International Building Code®, the Residential Code®, and the International Mechanical Code® that states "…protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste…"

This change also provides clarity to the means to be used to determine whether a material or device meets the requirements of to prevent flame, hot gases, and ember penetration into the structure. Section 7.5 of ASTM E119 provides a specific means to employ a cotton pad test.

This proposed language addresses construction that employs a material or device to protect a vent or ventilation opening, which can be tested as a vertical or horizontal test assembly that is an interior or exterior part of the structure. As with any fire scenario, the fire exposure subjected to vented construction can vary. However, the means to determine compliance with the intent to provide protection to the structure should be a constant.

This proposed language provides a means to address variables typically seen in construction. Many times vents are located in storage rooms and other areas where combustibles are stacked. Exterior vents are often in contact with landscaping (vegetation or forestation or both). In some cases, these combustibles are just inches from the vent. When these combustibles are subject to flash over conditions a fire may instantaneously occur with immediate flame impingement upon the vent or ventilation opening. Other times the Wildland fire generates a significant amount of hot gases and embers. Both of which can cause a fire within the structure if not prevented from entering it. The use of a cotton pad test provides a means to determine whether the material or device is meeting the prevention requirements.

Cost Impact: This change will not affect the cost of construction.

Analysis: ASTM E119 is currently referenced in the IWUIC. Updates in year edition will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

504.10-WUIC-NICHOLAS

Committee Action Hearing Results

For staff analysis of the content of ASTM E119-08a relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/ProposedStandards.pdf

Committee Action: **Disapproved**

Committee Reason: The committee's disapproval was based on its concern that the proposal would remove the proven protection of openings provided by the current ¼-inch mesh. The proposal was also considered excessive because it would, in effect, be creating a required protection similar to a penetration protection device where there is no fire resistance rated assembly at risk.

Assembly Action: **None**

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

John D. Nicholas, Perceptive Solutions LLC, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

504.10 Vents. Attic ventilation openings, foundation or underfloor vents, or other ventilation openings in vertical exterior walls and vents through roofs shall not exceed 144 square inches (0.0929 m^2) each. Such vents shall be covered with noncombustible corrosion-resistant mesh with openings not to exceed 1/4 inch (6.4 mm), or shall be designed and *approved* to prevent flame or ember penetration into the structure. <u>Flame penetration shall be determined using a standardized cotton pad test intended to detect flame and ensure the integrity of the vent, which is designed and *approved* for preventing flame penetration into the structure.</u>

Commenter's Reason: This change provides a standardized test that has been used for over 50 years (also referred internationally as an integrity test, flame test or ignition test). This simple test is used to detect flame and is referenced in many American National standards (ANSI), ASTM International standards, NFPA standards, and UL standards. This is a very simple cost-effective method to provide an enforcement provision for the 504.10 requirement and increase life safety.

The modifications submitted to this proposal are also intended to address the Committee's opinion related to 1/4-inch mesh as a proven method that prevents flame penetration into the structure. Erroneous re-rebuttal testimony misled also the Committee by calling the cotton pad test a fire resistance test used for building materials and penetration protection devices. The cotton pad test (described below) is no more of a fire resistance test than is the hose stream (water) test cited in ASTM E119. This clarification and modification submitted clearly resolves both of these Committee comments.

One of the many test methods citing the standardized cotton pad, which tests the vent's integrity to prevent flame penetration, is described in ASTM E2912.

1. ASTM E2912 provides an Integrity Test to assess whether a venting device prevents flame penetration. This test method defines integrity as "the ability of a test assembly, when exposed to fire from one side, to prevent the passage of flame or hot gases through it or the occurrence of flames on its unexposed side."
2. ASTM E2912 is not a fire resistance test: there is no fire resistance rating created or furnace time-temperature curve used. Rather, this test method is a fire performance test based on flame impingement used to assess a "venting device used as part of vented construction intended to resist the transfer of hot gas, radiation, and flame."
3. This test method is used to assess flame penetration through a "…building element or construction feature (such as a floor, wall, roof, ceiling, joint, door or wall cavity, crawl space, air gap, etc.) that includes an opening(s) used for venting…"that is referred to as "vented construction".
4. ASTM E2912 provides fire performance information about both interior and exterior vents that "are subject to a sudden direct flame impingement".
5. ASTM E2912 was under development for over four years and received a 100% affirmative vote (no editorial changes were even required) of ASTM Committee E05 on Fire, which is extremely rare for a new ASTM Committee E05 fire standard. This test method is also an American National Standard.

The following is an excerpt from the ASTM E2912 example cited above that describes the cotton pad test used to determine a venting device's integrity:

"11. Integrity Test

11.1 Record any flames on the unexposed side of the test specimen including the flame's location and duration.

11.2 Record flaming and ignition of cotton pad by hot gases or radiation, or both, throughout the test's duration. Record the time when ignition of the cotton pad occurs.

11.2.1 Use the materials and devices described in Annex A1 Cotton Pad Test Materials and Equipment.

11.2.2 Follow the Ignition Test Procedure in Annex A2.

11.2.3When no ignition (defined in A2.4) of the cotton pad occurs during the 30-s application, make screening tests that involve short duration application of the cotton pad over and around such areas. Charring of the pad provides only an indication of imminent failure. Employ an unused cotton pad to confirm an integrity failure.

11.3 When possible, photograph the test specimen when any flames occur on its unexposed side or when the cotton pad ignites, or both. Otherwise, refer to the video recording for this information.

ANNEX
(Mandatory Information)

A1. COTTON PAD TEST MATERIALS AND EQUIPMENT

A1.1 Where required by the conditions of acceptance in other sections of this standard to determine that the test specimen has not allowed the passage of gases or radiation hot enough to ignite a cotton pad, the cotton pad test shall be conducted in accordance with A2 during the fire-resistance test whenever a crack, hole, opened joint, or other similar void or defect through which hot gases are capable of passing is observed in the unexposed surface of the test specimen.

A1.2 The cotton pad test shall be conducted using a cotton pad as described in A1.3 and A1.4 in a wire frame provided with a handle as described in A1.5.

A1.3 The cotton pad shall comply with the physical characteristics described in A1.3.1 through A1.3.3.

A1.3.1 The cotton pad shall be nominally 4 by 4 in. (100 by 100 mm) by 0.75 in. (19 mm) thick.

A1.3.2 The cotton pad shall consist of new, undyed, soft cotton fibers, without any admixture of artificial fibers.

A1.3.3 The cotton pad shall weigh 0.12 ± 0.02 oz (3.5 ± 0.5 g).

A1.4 The cotton pad shall be conditioned prior to the test by drying in an oven at 212 ± 9°F (100 ± 5°C) for a period of not less than 30 min. Immediately upon removal from the drying oven, the cotton pad shall be stored in a desiccator for a period of not less than 24 h prior to the fire-resistance test.

A1.5 The frame used to hold the cotton pad for the purpose of the cotton waste test shall be constructed using No. 16 AWG (0.05 in.) (1.3 mm) steel wire which has been fastened to a handle that has a length that reaches all points on the unexposed surface of the test specimen. See Fig. A1.

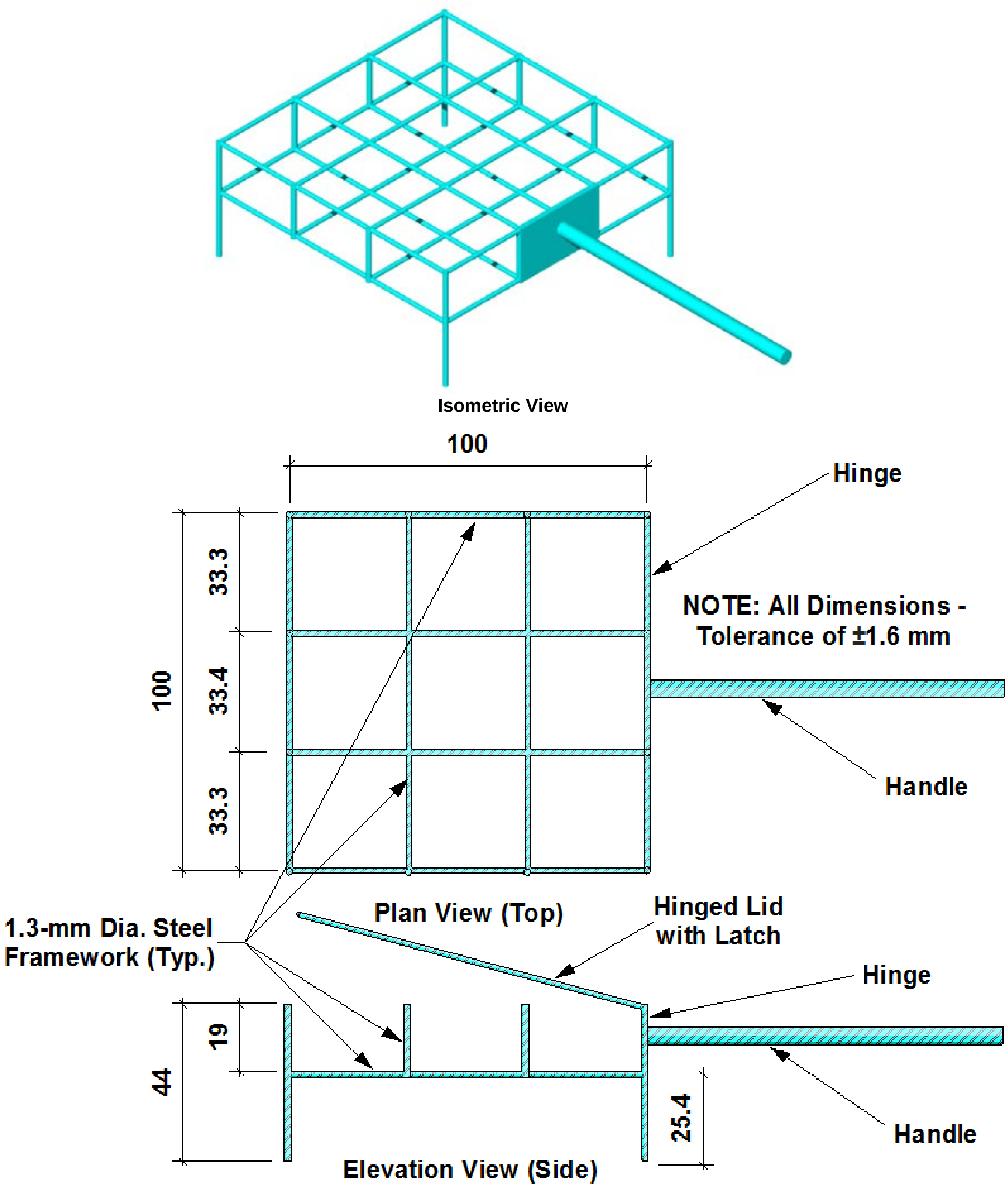


Fig. A1 Typical Cotton Pad Holder

A2. IGNITION TEST PROCEDURE

A2.1 Conduct the cotton pad test using an unused cotton pad.
A2.2 Position the cotton pad directly over the observed crack, hole, opened joint, or other similar void or defect in the unexposed surface of the test specimen, approximately 1 ± 1⁄8 in. (25 ± 3 mm) from the surface, for a period of 30 ± 1 s or until ignition of the cotton pad, whichever occurs first.
A2.3 All test locations previously tested in accordance with A2.2 shall be retested as close as practical to the end of the desired fire-resistance period. An unused cotton pad shall be positioned over each previously tested location on the unexposed surface of the test specimen.
A2.4 Ignition of the cotton pad shall be defined as glowing, flaming or smoldering of the cotton pad. Charring of the cotton pad shall not be an indication of ignition.
A2.5 If ignition of the cotton pad occurs, record the time at which ignition occurs, and report the description of the crack, hole, opened joint, or other similar void or defect and the location where it occurs.

Public Comment 2:

Eivind Elnan, Ax Innovasjon AS, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

504.10 Vents. Attic ventilation openings, foundation or underfloor vents, or other ventilation openings in vertical exterior walls and vents through roofs shall not exceed 144 square inches (0.0929 m^2) each. Such vents shall be covered with noncombustible corrosion-resistant mesh with openings not to exceed ~~1/4~~ 1/8 inch (~~6.4~~ 3.2 mm), or shall be designed and approved to prevent flame or ember penetration into the structure.

Commenter's Reason: This change is proposed as continuity between wildfire codes to improve life safety and reduce property damage. The change from "1/4 inch (6.4 mm)" to "1/8-inch (3.2mm)" is based on the 2010 California Building Code (CBC), Title 24, Part 2 (First Printing), Includes Errata Supplement through July 1, 2012 under Chapter 7A - Materials and Construction Methods for Exterior Wildfire Exposure. This change is presented even though there are other more restrictive requirements for wildfire protection cited based on wildfire experience worldwide and ember penetration testing, such as in Australia that allows a maximum of 2mm openings or NIST documents that suggest approximately 1mm openings are far greater ember penetration protection than the "¼-inch mesh".

CBC SECTION 706A VENTS states, "706A.1 General. Where provided, ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation shall be in accordance with Section 1203 and Sections 706A.1 through 706A.3 to resist building ignition from the intrusion of burning embers and flame through the ventilation openings.

706A.2 Requirements. Ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation openings shall be fully covered with metal wire mesh, vents, other materials or other devices that meet the following requirements:

1. The dimensions of the openings therein shall be a minimum of 1/16-inch (1.6 mm) and shall not exceed 1/8-inch (3.2mm).
2. The materials used shall be noncombustible.

   Exception: Vents located under the roof covering, along the ridge of roofs, with the exposed surface of the vent covered by noncombustible wire mesh, may be of combustible materials.

3. The materials used shall be corrosion resistant."

WUIC5-13

Final Action: AS AM AMPC____ D